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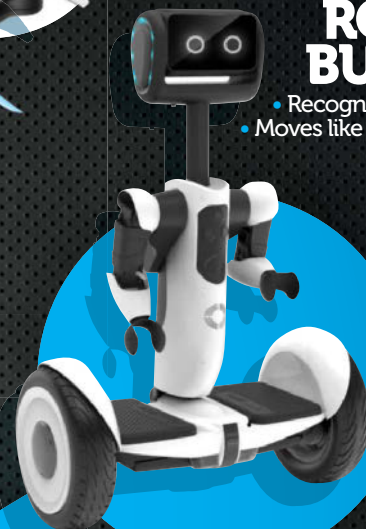
KNOW YOUR DRONE LAWS

- Where can you fly?
- Do you need to register?



SEGWAY'S ROBOT BUTLER

- Recognises your face
- Moves like a hoverboard



CARS OF TOMORROW

- Self-driving supercars
- Upgrade your wheels

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FUTURE TECH

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ESSENTIAL
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ULTIMATE WI-FI MUSIC SET-UP

- Guide to going wireless
- Best Bluetooth speakers



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- VR cameras to suit any wallet
- Step-by-step guide



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- Air fryers taste-tested

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+ HOVERBOARDS



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+ MUCH MORE



ALL LOGOS ARE TRADEMARKS OF THEIR RESPECTIVE COMPANIES

Revving up issue 5



"Driving with a steering wheel is as antiquated as wanting to ride a horse." This is the sort of grand pronouncement you would expect from Elon Musk when

launching a new all-singing, all-dancing Tesla, or Google when discussing its own self-driving car project, so the fact it was said by Mark Fields, chief executive of Ford, is all the more exciting.

A mere century and a bit after Ford convinced the world to trade the horse-drawn cart in for the Model T, Fields thinks the company can revolutionise transport again. He's promised a self-driving Ford by the end of this year, and he's not alone. Tesla already makes cars that can drive on their own, tech giants Google and Apple (if rumours are to be believed) are both working on it and established car makers like Toyota, Audi and BMW also plan to produce autonomous automobiles by 2020.

However, self-driving cars are just the start. In our car tech special, you can find out how cars might one day be hydrogen-powered and also wirelessly-charged, as well as those that have their own companion drones to fly alongside or work with Amazon Echo. We also roadtest the new Porsche Panamera, asking if it's still worth buying a hybrid car or if you should go fully electric.

Don't have thousands of pounds to throw away on a new car? Don't worry! We also have a practical guide to the essential kit to upgrade your existing ride and show you how to install all the gizmos, step by step.

Jack Parsons
Editor

THE TEAM'S TOP TECH THIS MONTH

Dan Hutchinson
Editor in chief

If you want to upgrade your home hi-fi, the Quad Vena (page 60) really knows how to drops the bass.



Rebecca Richards
Production Editor

I'm all about tasty food, and the Philips AirFryer (page 90) is a great way to cook healthy chips.



Dom Peppiatt
Senior Staff Writer

Upgrading my PS4's thumbsticks (page 44) was the smartest move I have made for a long time!



Andy Downes
Senior Art Editor

As a designer, the Wacom Bamboo Spark (page 84), is very handy for transferring layout sketches to digital.



Harriet Knight
Assistant Designer

The Withings Activite Steel (page 50) is a stylish alternative to some truly ugly wearables.



The FFZERO1 wants to reinvent the car. Find out how on page 14



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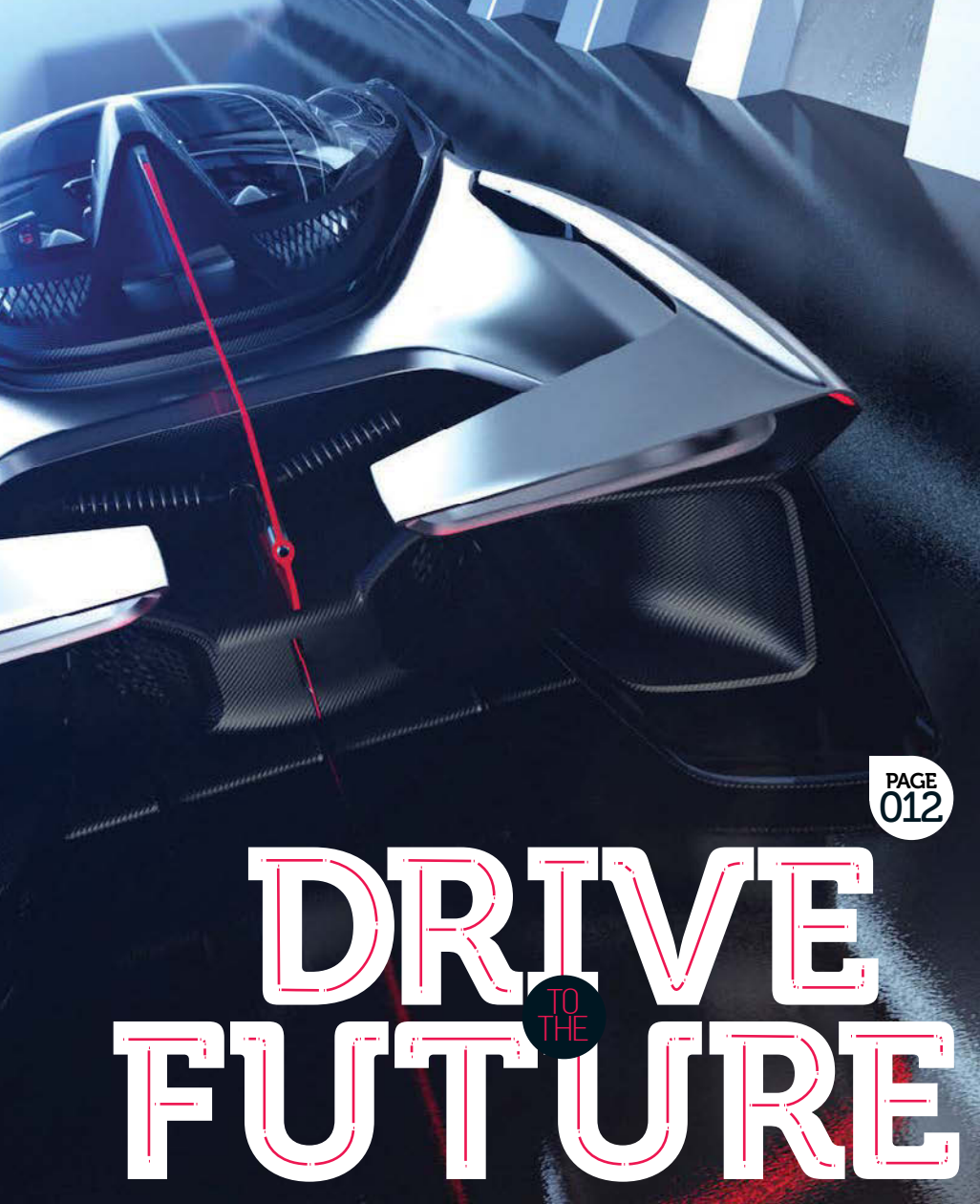
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**GET THE ULTIMATE
WI-FI SPEAKER SET-UP**

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Never miss an issue with our special subscription offer on page 42

- 114** **Whatever Happened To...**
Kodak Instamatic 100



STARTUP

KICKASS KICKSTARTERS • NEAR-FUTURE TECH
LATEST LAUNCHES

SEGWAY'S NEW ROBOT BUTLER

ETA SUMMER '16

Did you think all those horror stories about exploding chargers would kill the hoverboard? You were wrong. Segway is working to bring them back and this time they'll be safe-aware.

On the face of it, the Segway robot, created in conjunction with Intel and Chinese company Ninebot, is a two-wheeled scooter that's able to hit a top speed of more than 11mph and travel for up to 30 kilometres (about 18.5 miles) on a single charge. Although it doesn't have a handle, it works like an ordinary, self-balancing Segway, enabling you to shift your weight to move forwards and backwards, left and right. However, unlike other hoverboards, things become much more interesting after you step off.

A screen with a pair of expressive eyes pop up from the top of the device as the robot comes to life. It can understand voice

commands thanks to its sensitive microphone and respond in a suitably Johnny Five-like voice. You can ask it to carry out the most menial of tasks, like stream video on its display or answer the front door. It can then escort people it knows via facial-recognition into your home. What's more, its advanced Intel RealSense camera can tell where all of your furniture is located so it won't end up smashing into things as it moves around.

Even better, the Segway Robot is designed to connect to other smart hardware too, enabling you to monitor your home and interact with it. Yet it's the future possibilities that are the most exciting thing here: the Developer Edition of the Segway Robot is going to be released this summer and that will permit coders to come up with a tonne of cool dedicated apps for the robot ahead of the public launch.

FOLLOW THE LEADER

As well as record video and snap photos, the Segway Robot's RealSense camera and fisheye tracking camera help it to understand what it sees by mapping and detecting its environment in real time. One neat trick is the ability to image a particular person in order to keep an eye on their movements. By commanding it to "follow me", the Segway Robot can navigate and stick to you like glue.



It moves so smoothly

With 800-watt double motors and a maximum torque of 70Nm, the robot is capable of a nippy, agile, smooth and tight-turning ride

Brain power

The Segway Robot has an Intel Atom processor runs on an Android operating system, which develops can easily code apps for

Depth-sensing camera

Three depth-sensing lenses across the front of the screen form part of the Intel RealSense 3D-mapping camera – perfect for object recognition and preventing the robot from bumping into things

Take pictures

In addition to all those sensor cameras, the Segway Robot also has a photo camera so it can take pictures and record video



Air-filled tyres

Rather than have the plastic wheels of some hoverboards, this robot has air-inflated tyres. The central pole also comes up to knee level rather than arm height as with other Segways



GIVE IT A HELPING HAND

To ride the robot, the head folds back and the neck turns 90 degrees to slide into the main body. However, what you see is not entirely the extent of what you get. You can slip the back off the robot and add customisable attachments, such as a pair of arms that look like they belong to a LEGO minifigure. During a demonstration at the CES 2016 show, the robot instantly recognised its new limbs. "Are these my arms?" it asked, moving them before its eyes. "Awesome!"

STARTUP

Smart and strong

The watch has a pressure sensor, accelerometer, gyrometer and compass, and it can also cope with sudden shocks, vibrations, humidity, extreme temperatures and low and high pressure

Easy to operate

There are three chunky power buttons, including one for tools, such as the pressure sensor, and one to display Android apps. They can be operated while wearing your gloves

Different colour watch faces

There is a range of different colour watch faces for outdoor use displaying altitude, temperature and more. Be warned, using the colour LCD will eat your battery within a day

Metal body

The waterproof body of the watch is made of metal and the strap is rubber. It feels very robust and comes in one of four different colours

CASIO'S NEW SMARTWATCH HAS A ONE-MONTH BATTERY

ETA spring '16

Only a brave soul would ride the river rapids, hike through the mountains or nip to the shops in a torrential downpour with an Apple Watch strapped to their wrist. Yet, if you choose to wear the gigantic WSD-F10 instead, you could confidently do all of these things.

Casio's first Android Wear smartwatch is as rugged as they come – a far cry from the firm's rather more brittle, spongy-keyed calculator watches of the Eighties. Designed for people who love the great, weather-beaten outdoors, it

has been tested to military standard specifications (MIL-STD-810G if you must ask) and it also comes with apps specifically designed for trekking, cycling and fishing.

More able to survive the fiercest of conditions than most of us, it's water-resistant to 50 metres and, while it has a cool yet power-zapping 1.32-inch touch-screen colour display, it's also built to last. Change it to monochrome mode and it will stay powered for as long as a month. We reckon that will buy you enough time to navigate out of any situation.



IT'S ALWAYS 'APPY HOUR WITH SOMABAR

ETA JULY '16

Cocktails are an art form, as any mixologist will tell you. You need the correct ingredients, the right blend, a bit of shaking, some stirring and, crucially, a large slice of time. Or do you? Somabar is a bartending machine that takes all of the effort out of making a drink while also getting the time down to a mere five seconds.

The bartender bot, which comes in various colours, sits on your kitchen worktop and connects to a smartphone app containing hundreds of recipes. By filling the six 750ml 'Soma Pods' down each side with your own liquor and ingredients and topping up the

150ml pod with bitters, you can create your order, press a button and have the drink poured far faster than you can catch a bartender's gaze.

Each of the pods has a scannable tag attached so the machine knows which bottle contains what contents. They are secured with an airtight seal to keep the contents fresh, which means you can pop them in the fridge when you're done. However, while the drinks taste authentic, the process does lose the flamboyant artistry of mixology. Drinks also aren't chilled, so you have to add your own ice.

Mixing device

At the top of the machine is a mixing device. Proprietary static-mixing technology ensures the liquid is brought together in the right proportions before it is sent to your glass

Bitters pod

There's a 150ml pod for bitters that enables you to add your own bitter, sour or bittersweet flavour to your cocktails. These are then thrown into the mix

Where the magic happens

The electronic wizardry sits in the back of the machine. A control board works out how much liquid from each pod to draw. The Somabar is connected by Wi-Fi so you can control the magic through a connected app

Nozzle and space

A cocktail glass can fit perfectly in this tall section of the Somabar. A nozzle dispenses the mixed cocktail, ready for you to sip contentedly

Water-flushing container

Behind here is a container filled with water that is used to flush the pipes to ensure each drink is untainted by a previous one

Soma pods

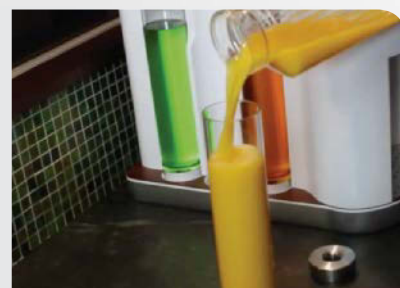
Liquid is extracted from the bottom of the Soma pods using positive displacement pumps. It is then sucked up to the top of the machine and mixed

Drip tray

You may not want to spill a drop, but it's inevitable that some precious cocktail liquid will drip. This tray collects it without mess

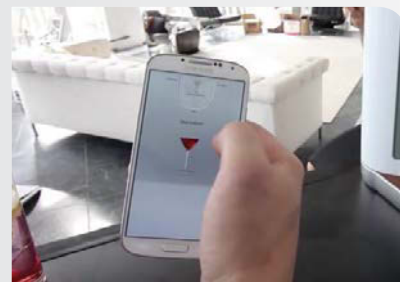


MAKE A COCKTAIL



01 Fill Soma Pods

Somabar thankfully doesn't force you into buying pre-filled pods: you can just buy the liquor you want and fill each of the six pods yourself.



02 Select a recipe

The app works in one of two ways. You can either tell the app the ingredients you have and generate a recipe using these or have it suggest the ingredients you need for a specific cocktail.



03 Press the button

When you are ready and have filled the bitters pod too, the machine gets down to work, mixing the drinks before pouring it into your glass.

STARTUP



01



02

01 Kerv

Kerv is the latest gadget to jump on the contactless payment bandwagon, an NFC-enabled smart ring for small transactions.

£25 | \$36 | kerv.com

02 Ravean Jacket

A heated outdoor jacket with manual temperature control and the option to charge up your mobile devices as well – what's not to like?

£165 | \$249 | ravean.com



03



04

03 Lukla Endeavour

Though quite pricey, few other jackets have been developed using NASA technology to keep you warm in any temperature.

£205 | \$299 | luklaapparel.com

04 SleepPhones Effortless

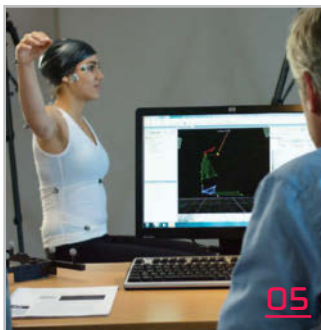
It's difficult to listen to music with headphones in bed, but this wireless headband could change that.

£27 | \$40 | sleepphones.com

KICKSTARTER

10

WEARABLES AND SMART CLOTHES



05



06

05 Percko

Percko is a discreet smart undershirt to improve your posture little by little, using slight vibrations it prods your body into the best shape.

£82 | \$119 | percko.com

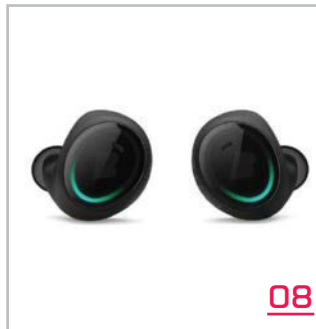
06 MyoWare Sensor

This wearable muscle movement sensor can be used to make everything from a Wolverine glove to a high-tech prosthetic limb.

£26 | \$38 | bit.ly/1mPFouz



07



08

07 Eyecatcher

Eyecatcher is an interesting wearable that offers an e-ink screen that's packed with information relayed from your smartphone.

£190 | \$275 | lookseelabs.com

08 The Dash

One of the most successful Kickstarter wearable projects of all time, these headphones can track your heart rate and location.

£224 | \$326 | bragi.com



09



10

09 Cold Shoulder Vest

By keeping your body chilled, this vest helps you burn calories when standing still. It may be far-fetched, but it's scientifically proven.

£137 | \$200 | bit.ly/1PRRMDi

10 Blocks

Blocks wants to bring a modular approach to smartwatches, so you can pick and choose different sensors best suited to you.

£195 | \$295 | chooseblocks.com



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DRIVE TO THE

NEXT-GENERATION SUPERCARS THAT ARE



DRIVE • FUTURE

Car tech has moved up a gear. Where once a high-tech car might have been one with an electric sunroof, teeth-shaking subwoofers, or more recently, built-in GPS, the game was changed the day Tesla sold its first electric Roadster.

This was never more clear than at this year's Consumer Electronics Show. Traditionally the event where tech-makers announce the year's must-have gadgets, this year the auto industry was out in full, alongside all the smartphones, virtual reality headsets and flying drones. But it wasn't Google or new

companies like Faraday Future committing itself to self-driving cars.

All of the biggest and oldest names in car tech were here, saying they were working on something new: Ford announced its connecting its cars to Amazon Echo; BMW wants to replace wing-mirrors with cameras; more than one manufacturer touted hydrogen fuel cells. Many of these were just 'concept cars,' others are in development, but all of them prove car tech is in overdrive. Buckle up – it's now time to take a tour through the future of automotive transport.

FUTURE

RACING TO REINVENT THE WHEEL



*“Take a tour through the future
of automotive transport”*

FFZERO1

EVER WANTED YOUR **VERY OWN** BATMOBILE?

Air conduits

Aero tunnels run through the car, allowing air to flow through it rather than around it, reducing drag while cooling batteries



Quad-core motors

While production models will only have one to three motors, the FFZERO1 has four, one by each wheel, giving it more than 1000 horsepower and top speeds of 200mph

DRIVE • FUTURE

KEY STATS

FFZERO1

TOP SPEED

0-60MPH

MAXIMUM
POWER

200 MPH

0.03

1,000 **BHP**

RELEASE DATE: 2018



Smartphone controls

The car is autonomous, but it comes with the option to slot your smartphone into the steering wheel. You can then use this as an interface to further control the car

Looking like something out of *Batman* or *Speed Racer*, Faraday Future's 200mph electric hypercar wants to redefine what you think a car should be. Never heard of Faraday Future? That's not surprising, as it only sprang up in Silicon Valley in 2014, promising to revolutionise the motor industry.

Just 18 months later, the company has poached a huge contingent of Tesla's staff, is about to break ground on a billion-dollar factory outside Las Vegas, and has unveiled the FFZERO1. Described by the company as a 'car of concepts,' the FFZERO1 is a self-driving

racecar with 1000 horsepower, which you can also control with your smartphone.

It's uncertain how many FFZERO1's will ever actually be made. With only a single seat and the need to wear a specialist helmet, it's unlikely Faraday Future's mass-produced models will look much like it – at least on the outside. Under the chassis, however, every Faraday Future car will have the same modular architecture as the FFZERO1. This, the company says, is what makes them so easy to build, and makes them confident we'll be riding around in its next-gen vehicles by 2018.



High-tech helmet

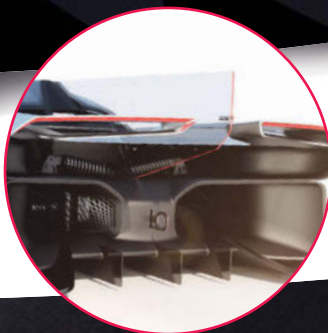
As if the FFZERO1 didn't look and feel enough like a spaceship, it also comes with a helmet that supplies water and oxygen to the driver and could also track their health

**Rocket seat**

Inspired by NASA research into zero gravity, the FFZERO1's single seat is tilted at a 45-degree angle to promote blood circulation and maximise comfort

**Transparent tail fin**

The Le Mans Prototype-style fin doesn't just improve stability at high speeds, it also acts as a digital display that could show the driver's name, remaining battery life, and more



A BLUEPRINT TO BUILD ON

The FFZERO1 and all subsequent Faraday Future cars will be built using a new system called Variable Platform Architecture (zero points to Faraday here for creativity in the name). This means all of its electric vehicles will all have the same skateboard-like chassis, which can be quickly adapted to include anything from one to four motors, so-called 'strings' of batteries, different wheelbases and other extra features. By choosing the modular route, Faraday will be able to minimise production costs, copy and paste safety features from model to model, and support a range of vehicles in all shapes and sizes.



Audi H-Tron Quattro

THIS SPEEDY SELF-DRIVING SUV IS
**POWERED BY
HYDROGEN**



Backup batteries

The main engine of this car is powered by hydrogen fuel cells, but there's a lithium-ion battery standing by for bonus bursts of power

Suspending disbelief

Audi is reusing the Q7's air-suspension systems in this concept, which ride on 22-inch wheels. This makes for a smooth ride that's much more stable for the hydrogen fuel bay



KEY STATS

Audi H-Tron Quattro

TOP SPEED



124 MPH

0-60MPH

0.07

MAXIMUM POWER

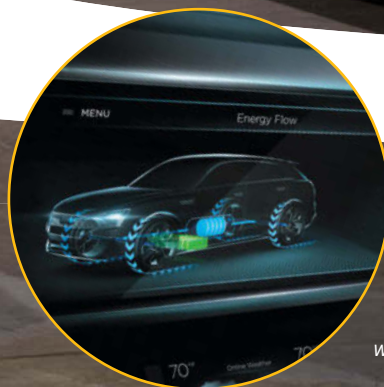
134 BHP

MAXIMUM TORQUE: 406NM

LENGTH: 4,880 MM

WIDTH: 1,930 MM

RELEASE DATE: 2020



Smart power

At low speeds, the car flips to front-wheel drive and draws power from the batteries. When low on power, it automatically switches to pushing hydrogen fuel



A panel show

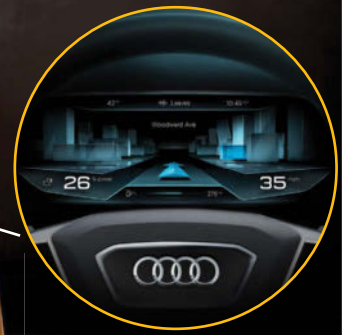
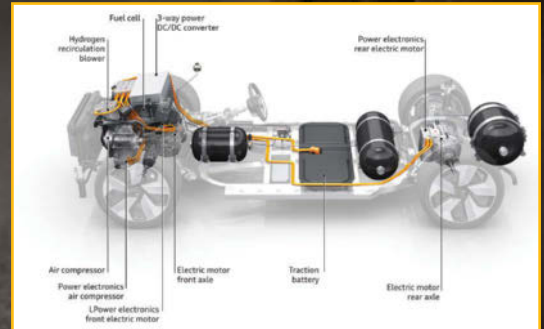
Aside from bonus lithium batteries and the central hydrogen fuel source, the H-Tron also has 320-watt solar panels

This speedy SUV promises to make electric cars even greener with a hydrogen fuel cell, pumping out zero emissions. Audi says this four-wheel drive can reach up to 62 mph in under seven seconds, go further than most electric vehicles by reaching 600 kilometres (373 miles) on a single tank, and refill just as quickly as a conventional car, taking only four minutes.

The first Quattro to be all-electric, the car's state-of-the-art battery can deliver 110 kW. It also has two motors, with one on each axle. The H-Tron can park itself, navigate traffic jams and drive autonomously up to 40mph. The H-Tron itself is planned to reach production in 2020, but this self-driving tech will also be included in the new Audi A8 sedan, out next year.

Central nervous system

The motors and fuel cells are controlled by a management system that's geared for efficiency – it's an all-wheel drive, powered by single-speed planetary gear sets



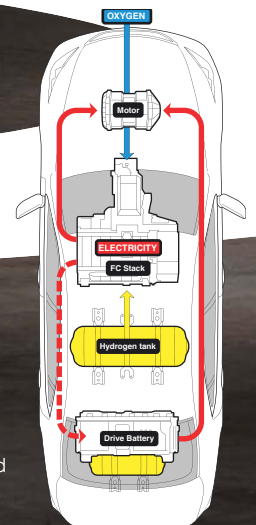
Headlight experimenting

The headlights are based on tech that Audi wants to explore in the future – a mix of organic light emitting diodes (OLEDs) and matrix LEDs

HOW DO HYDROGEN FUEL CELLS WORK?

Silent and pollution free, hydrogen fuel cells are the cleanest and greenest power source that has been developed so far. Stored as fuel cells, hydrogen uses reactions to power cars. Hydrogen gas is stored in a tank and fuel is fed from this tank into a positively charged terminal (usually made of platinum). The terminal splits the hydrogen

molecules into hydrogen ions (protons) and electrons. The protons are attracted to another terminal in the engine – this one is negatively charged – and then react with oxygen, which is released from the exhaust as water. The electrons travel to a dedicated circuit board to power the electric motor that operates the wheels.



BMW i8 Mirrorless

MIRRORLESS BMW HAS **NO** **BLIND SPOTS**

The unique selling point of this car is in its name, the BMW i8 Mirrorless is a car – you guessed it – that doesn't have mirrors. However, there's more to this beast than that. BMW wants to circumvent the problems this design throws up – the tech that replaces the mirrors relies on three tiny cameras that have been fitted with dirt repellent-coated Gorilla Glass lenses. Two of them are positioned in the doors and the third is above the rear window.

Each camera captures its own footage, but an on-board computer stitches the photos together and transfers the image to a screen that replaces the rear-view mirror for you to see. These cameras can even detect and monitor objects that are coming up behind you, then warn you if there's anything encroaching on one of the BMW i8's blind spots. The camera will naturally widen too for a larger field of view, if you're about to make a turn.

Heads up!

The traditional rear-view mirror has been replaced with a 300mm x 75mm display. This shows the driver a smart interpretation of the road with overlays, rather than just reflecting it

Smart rain protection

The not-quite wing mirrors channel rain off of the windscreen and onto the side windows, making for greater visibility

Under the hood

The BMW i8 Mirrorless is powered by a 228-horsepower 1.5-litre twin-turbo three-cylinder engine, paired with a 129-horsepower electric motor, with an estimated 330-mile range



KEY STATS

BMW i8 Mirrorless

TOP SPEED 155 MPH
0-60MPH 0:04
MAXIMUM POWER 357 BHP

MAXIMUM TORQUE: 236NM

WEIGHT: 1,490 KG

LENGTH: 4,689 MM

WIDTH: 1,942 MM

RELEASE DATE: TESTING IN 2017

CAN CAMERAS REALLY REPLACE MIRRORS?

Since US and European laws both say cars must have mirrors, it might be a while until we see a concept like BMW's actually take to the roads. Yet using cameras do have some major benefits: firstly, BMW reckons by using three cameras to observe the entire field of view behind the car, the tech will eliminate blind spots altogether. Secondly, the cameras are often fitted with sensors too, meaning they operate far better than the human eye in darkness. In fact, by 2018, all cars in the US will have to be fitted with rear-view cameras by law – it just seems BMW is taking this a step further.



Aerodynamic

The sharp design wasn't created to just be eye-catching: BMW has also created the car with optimised aeroacoustics in mind, meaning passengers hear less noise from the wind brushing against the car

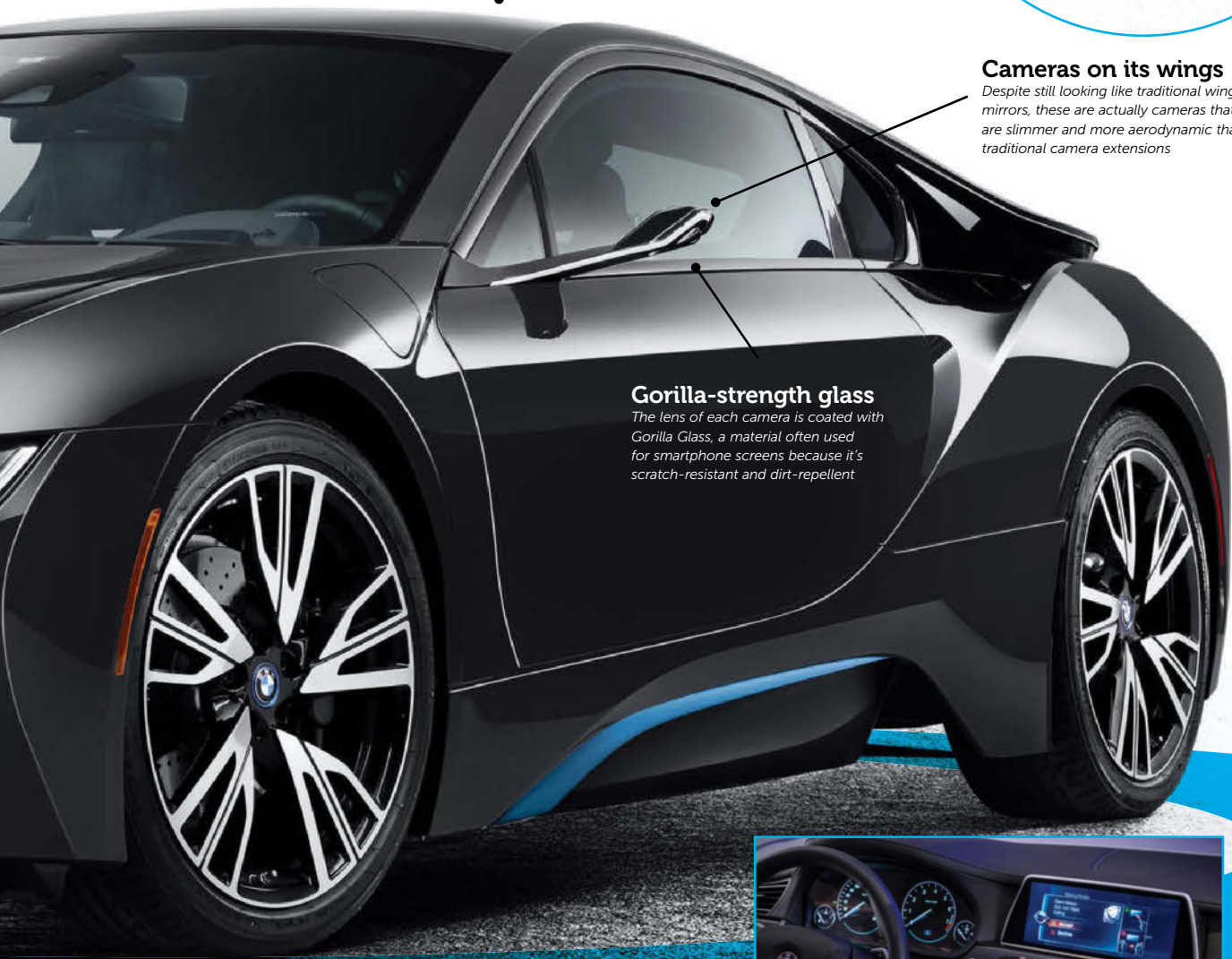


Cameras on its wings

Despite still looking like traditional wing mirrors, these are actually cameras that are slimmer and more aerodynamic than traditional camera extensions

Gorilla-strength glass

The lens of each camera is coated with Gorilla Glass, a material often used for smartphone screens because it's scratch-resistant and dirt-repellent



VW BUDD-e

VOLKSWAGEN'S GROOVY ECO-FRIENDLY MAGIC BUS

After the recent Dieselgate scandal, VW has a lot to prove. It needs to win back its consumers' trust, and it can only do that by proving that it is still in touch with its hippy camper van crowd roots, that it still gives a damn about the environment after all.

Enter the BUDD-e, a totally electric, solar-powered mini van. A 21st Century take on the mobile home, it will also speak to all of your smart home products, so you can queue up your favourite TV shows and turn on your central heating while driving home. The van's dashboard is also totally buttonless; instead you say "Hello BUDD-e" and command it to do things like you would Siri on your iPhone.

This microbus has supposedly been in the works since 2001, but there's no set release date, though some of the battery tech will be seen in future VWs coming out in 2019.



Retro and futuristic

Despite losing that old flat-nose look VW minibuses are known for (thanks to crash test standards), the car retains that old VW style, tapping into the powerful pull of nostalgia

DRIVE • FUTURE



KEY STATS

VW BUDD-e

TOP SPEED



93 MPH

0-60MPH

0.07

MAXIMUM POWER

312 BHP

MAXIMUM TORQUE: 200NM

LENGTH: 4,597 MM

WIDTH: 1,940 MM

RELEASE DATE: UNKNOWN

Born to run

VW has made the most of the van's large, square stance to fit a 92.4 kilowatt-hour battery pack in there – that's almost four times what you would find in a regular electric car. As a result, the BUDD-e has an impressive 331-mile range



THE FUTURE'S BRIGHT

While the main source of the BUDD-E's power will come from plugging it in, VW has also made the most of the camper van's large 4597mm long roof by embedding solar panels in it to harness the power of the sun and charge the microbus as you go.

Gesture controls

Touch, voice and gesture controls can be used to operate what VW calls infotainment panels in the car, such as, waving your hand will open the door and making a kicking motion will open the boot



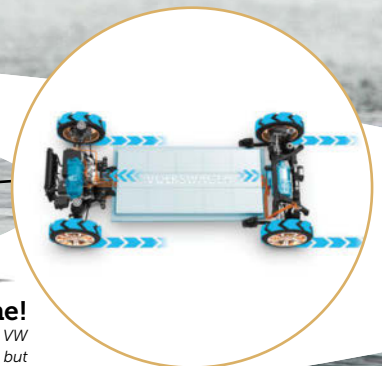
System display

Directly in front of the driver there's an active information display that can show vehicle status, GPS, music browsing apps, heating settings or even smart systems that let you connect with your home



Motoring on

The BUDD-e has two motors – one in the front, one in the back – and can reach top speeds of 93mph



All four one!

The wheelbase of the car isn't as big as the current VW models on the market – it's only 4.6 metres long – but with a four-wheel drive it's nippy for its size



2017 Ford GT

THE CAR WITH THE BEST EVER POWER- TO-WEIGHT RATIO

The GT brand has an interesting history. It originally came about because Henry Ford was furious that Enzo Ferrari pulled out of a Ford takeover deal at the last minute. Ford swore to destroy his rival symbolically – on the racetrack of Le Mans. Ford engineers created the GT40 for this purpose and it won Le Mans four years in a row.

Some 40 years later, Ford trialed the GT for commercial use, but the model was

only in production for two years before work on the car stopped. But the GT is back now and Ford is keen to make another statement with its return: that it will win the Eco-Supercar arms race too. This reinterpretation of the classic model has done everything it can to reduce its weight, making it race-ready and poised to recreate the success of the original car.

DRIVE • FUTURE



Feel the power

Ford can pump those impressive stats out of the engine thanks to a combination port/direct injection system, low-friction roller-finger-follower valve train and two turbochargers

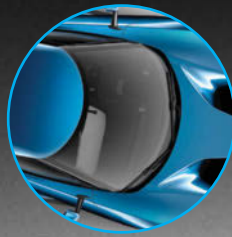
KEY STATS		
2017 Ford GT		
TOP SPEED	0-60MPH	MAXIMUM POWER
200 MPH	0:03 ₂	600 BHP
MAXIMUM TORQUE: 600NM		
WEIGHT: 1,310 KG		
LENGTH: 4,640 MM		
WIDTH: 1,950 MM		
RELEASE DATE: 2017		





A classic body

A super-light carbon fibre and aluminium construction makes the foundation of the GT's body. A material that's very durable yet incredibly light!



Gorilla Glass protection

The sloped windshield is made of a new kind of triple-layered Gorilla Glass that is thinner than traditional laminate glass and lowers the car's centre of gravity

INTRODUCING ALEXA, YOUR NEW DRIVING COMPANION

Amazon's own Siri (or Cortana) can start your car from your sofa. If you're using the Amazon Echo service and your Ford car is hooked up to it, you can ask Alexa (that's the interface Echo uses) to boot your car up at a specific time or even get it to a specific temperature. You can lock or unlock your vehicle, or check its fuel level. If you're feeling too modern to use a phone, don't worry: Ford cars from 2016 onwards will let you talk to Alexa via voice control in the steering wheel stack!



A vintage flavour

Despite looking new-fangled, there are a lot of legacy design features that lend themselves to the old GT models: circular taillights, the mid-engine design and that iconic sloped nose

Gauging interest

The gauge cluster has a configurable display that you can customise to show whatever you want. Settings range from multiple driving modes to personal data

Control from the cockpit

The seats of the GT are directly connected to the chassis, meaning the driver has a better feel for how the car behaves, alongside an adjustable steering wheel and pedals



Mercedes-Benz Concept IAA

THE SHAPE-SHIFTING TRANSFORMING CAR OF THE FUTURE

This concept is a silver bullet of technological advancement that's been designed explicitly with aerodynamic efficiency in mind by Mercedes-Benz. To that end, it's got two very different physical modes it can freely transform between: if it hits 50mph, a selection of specially designed panels will unfold around the front, rear and sides of the car to reduce drag and make the car more fuel-friendly.

This tech isn't brand new, as Mercedes currently has another concept in the works

that shows off very similar things (the F015 self-driving car). The IAA – this stands for intelligent aerodynamic automobile – actually feels closer to reality, though: especially since the transforming tech demoed in this vehicle already actually exists in the form of active aerodynamic systems in other cars; such systems that move ventilation panels and other exterior features to minimise drag and cool components. The IAA is just the next stage of this tech's evolution.

Steer clearly

Despite being a new steering wheel, you can tell design touches have been taken from the Mercedes S-Class, but with one key difference: all the old manual buttons have been replaced with touch-operated keys instead

DRIVE•FUTURE

KEY STATS

Mercedes-Benz Concept IAA

TOP SPEED

0-60MPH

MAXIMUM POWER

155 MPH

0.05s

279 BHP

MAXIMUM TORQUE: 475NM

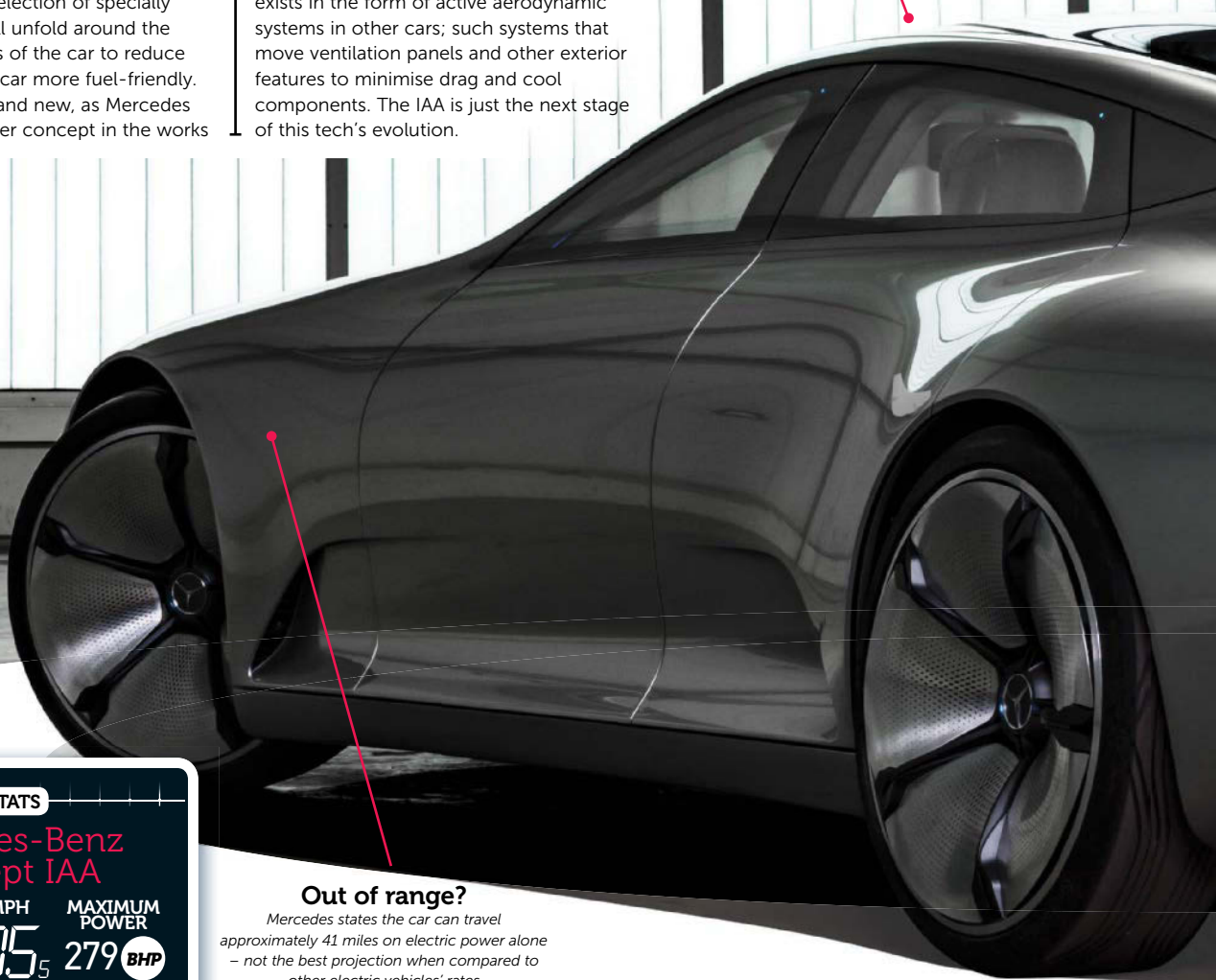
LENGTH: 5,040 MM

WIDTH: 1,995 MM

RELEASE DATE: UNKNOWN

Out of range?

Mercedes states the car can travel approximately 41 miles on electric power alone – not the best projection when compared to other electric vehicles' rates





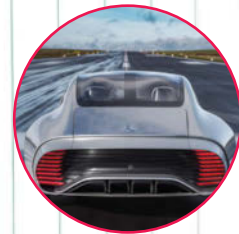
A ROBOT IN DISGUISE?

The transforming panels that make up the Concept IAA only begin to operate when the car hits 50mph (or you can activate it manually yourself). Eight segments extend at the rear, increasing the car's length by up to 390mm; front flaps in the front bumper extend by 25mm to the front and 20mm to the rear, improving the air flow around the front end and the front wheel arches, too. The Active Rims alter their cupping from 55mm to zero and the louvre in the front bumper moves 60mm to the rear, improving the underbody airflow.



Stay in style

The morphing exterior might be a world first, but the interior is still based on the S-Class. However, there are new ambient blue lights and slightly redesigned seats and door panels



Labour of love

The aerodynamic panels went through over 300 variations before Mercedes-Benz settled on the final design – it took one million CPU hours to decide the final build



Connective car

The concept features Car-to-X technology that enables communication with other vehicles and other sources of information in order to obtain road safety parameters and 'look around the corner'

Hybrid drive

The Concept IAA works on a plug-in hybrid drivetrain that combines petrol and at least one electric motor, which together pump out 279 horsepower and an electronically-limited 155mph top speed

Toyota FCV Plus

THIS IS AS MUCH A BATTERY AS IT IS A CAR

This futuristic hydrogen-powered sci-fi vehicle is a statement from Toyota. It seems to be directly inspired by something from *Futurama* or *Blade Runner* and it has a bizarre smoothly angular *Jetsons* aesthetic that scratches all those high-concept sci-fi itches all these other future cars have so far failed to satisfy.

The car is designed to showcase the potential use of hydrogen as a power source away from just cars. This unique vehicle is basically a battery on wheels. As

well as charge your phone and other electronics on the go, Toyota posits that the FCV Plus could wirelessly charge other vehicles or even power your home in a blackout.

If this all sounds a bit far-fetched, bear in mind that Toyota is calling the FCV Plus its vision of what cars could look like by 2030 – as the last few years in car tech prove – things could change a lot between now and then.

Family thinking

There are four seats in the car – making it more family-friendly than the vast majority of other concept cars that have been recently showcased

Smart positioning

The fuel stack is mounted between the front tyres and the hydrogen tank is behind the rear seat. With the adoption of independent in-wheel motors in all four wheels, this makes a spacious cabin area



KEY STATS

Toyota FCV Plus

TOP SPEED 0-60MPH
100+ MPH **0.08** N/A **BHP**

MAXIMUM TORQUE: 200NM
LENGTH: 3,800 MM
WIDTH: 1,750 MM
RELEASE DATE: 2030

Looks are everything

The exterior adopts a distinctive, sleek shape, while the frame structure of the interior ensures rigidity despite its lightweight frame



Community spirit

The car's fuel cell stack can be reused as an electricity-generating device, as well as an engine. Put to versatile uses around the world, these stacks could contribute significantly to local communities

Perpetual charge

In addition to the vehicle's own hydrogen tank, the car can also generate electricity directly from hydrogen stored outside the vehicle, thus creating a stable source of electric power for use at home or away

Plug and play

When the car is not being used as a means of transport, it shares its power generation capabilities with communities as part of the local infrastructure

Multi-coil charging pads

HOW DOES WIRELESS CHARGING WORK?

Wireless hydrogen-charging may be a decade or two away from reality for Toyota, but Qualcomm is confident its Halo wireless system will offer a solution for the common problem all electric cars face much sooner: running out of charge on the road.

Multi-coil charging pads operate on controlled magnetic flux

They can wirelessly charge even high ground clearance cars

Support high power charging
3.3 KW - 20 KW

Magnetic flux pipe increases the 'throw' of the charge

It's a universal bit of hardware: multiple manufacturers can use it

Charging pads can sit above, in line with or under the road

028

SHOULD YOU STILL
BUY A HYBRID?

SHOULD YOU STILL BUY A HYBRID?

Tesla is making electric cars look cooler than ever, but you might want to hedge your bets with a mixed-fuel motor for a little longer





There's no doubt about it, electric power is the certified fuel of the future for cars as the world begins to run out of the natural resources needed to make petrol and diesel. Companies such as Tesla and Faraday Future make all-electric cars look amazing, but with that all-important infrastructure still quite minimal – how many charge points do you see on the road compared to fuel stations? – car manufacturers around the world are still committed to developing hybrid technology, a system that utilises both a traditional internal combustion engine as well as an electric power source, to fill the gap between the time when cars can go completely electric.

But almost ten years on since the first Toyota Prius, are hybrid cars still worth our attention – and money – in the meantime? A host of global automotive manufacturers

seem to think so. The likes of Toyota, Lexus, Renault and Honda all have hybrid options for cars in their showrooms, with Porsche, the famous luxury and sports-car maker from Germany, currently boasting the most hybrid models available with a catalogue of three. Hybrid power in cars has even become sexy, never mind accepted: the holy trinity of modern million-pound hypercars in the Ferrari LaFerrari, Porsche 918 and McLaren P1 all use hybrid technology, albeit in different ways.

If you're passionate about saving the planet or if you want to protect your pocket, a hybrid car may be the answer. You can eke out figures far north of 50mpg and you don't need to be dependent on an accessible power socket to plug your car into overnight, with some hybrid vehicles using the engine to charge its batteries. Intrigued? You should be!

HOW DOES A HYBRID ENGINE ACTUALLY WORK?

Here's how two power sources help propel
the Panamera along the road

Traditional engine power

The Panamera's V6 internal
combustion engine is mounted in
the usual position, as in a normal car

Electric motor

Affixed between the engine and
gearbox is the electric motor. The
power from this also runs through
the eight-speed automatic gearbox

£88,967 | \$79,095
porsche.com

Porsche Panamera S E-hybrid

This is Porsche's second
attempt at giving hybrid
power to its luxury sports
saloon, a car that's popular
among the elite in both
China and Dubai.

Recoup energy whilst on the go

You can actually recoup lost power when
driving, as energy exerted during braking
is recovered by the electric motor, which
also operates as a generator

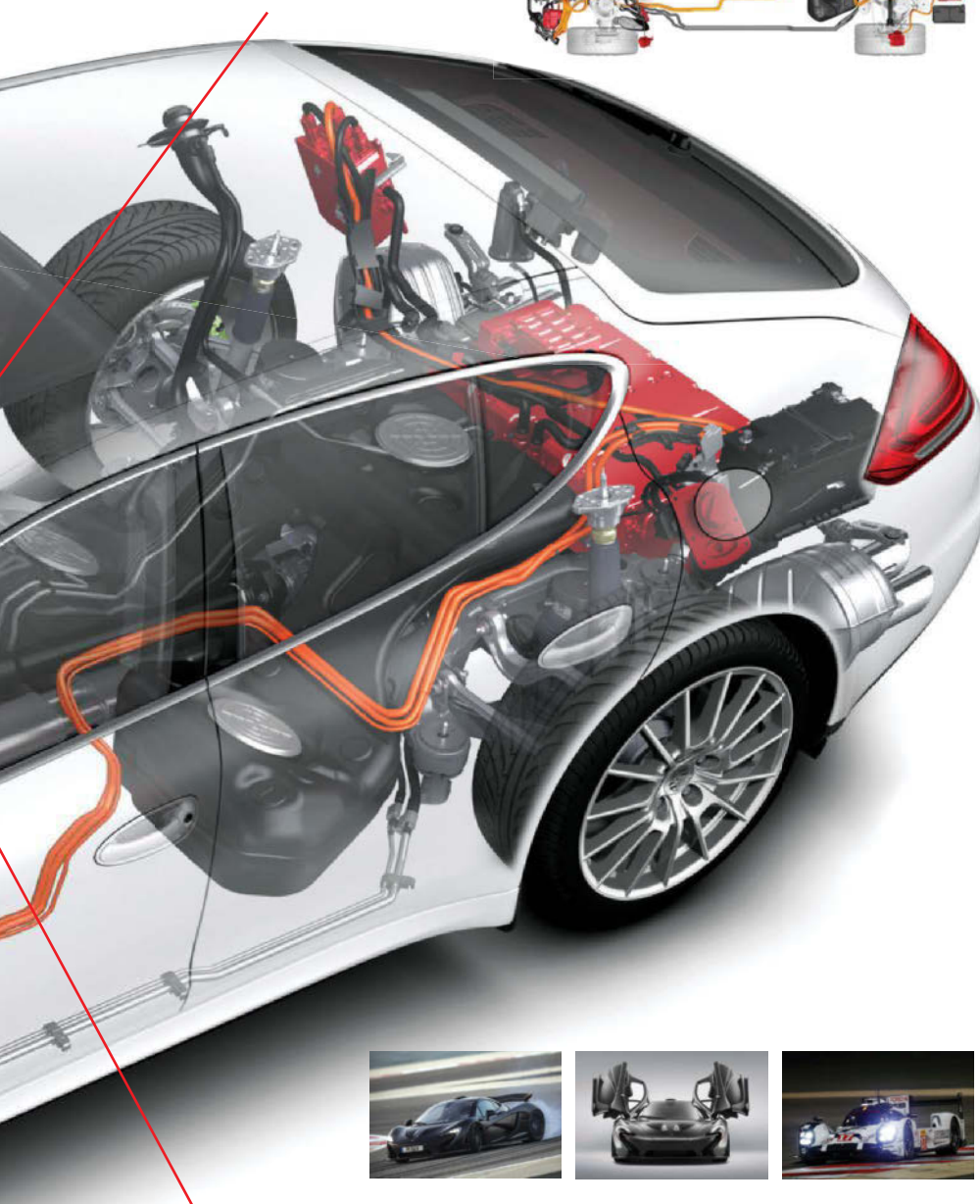
The power behind the pedal

An extra action point on the gas
pedal means the first portion of
acceleration is always electric, but
kick down past this point and the
traditional engine will kick in



Sport: for the best of both worlds

In Sport mode, the electric motor and traditional engine combine once the accelerator pedal reaches the 80 per cent point, giving you an extra boost in thrust



Choose your weapons

You can select between E-Power mode and E-Charge mode with a simple press of a button in the centre console, so you can drive completely emission-free or top up on power whenever you like



HYBRID TECHNOLOGY: A LONG-TIME SPORTING STABLE MATE

Think hybrid technology is relatively new to cars? Think again, because major motor-sport competitions have been stipulating the use of alternative power sources outside of internal combustion engines for years. Formula One first used the KERS system in 2009, which collected waste energy from braking and reused it as collected energy, giving drivers an 80bhp boost for approximately six seconds per lap. Meanwhile, teams in the World Endurance Championship (famous for staging the Le Mans 24 Hours) must use hybrid systems on all cars in the top category. Hybrid technology has added an extra dimension to racing and manufacturers have then passed on successful components to road cars (hypercars, such as the McLaren P1 use KERS), so it's a win for everyone!

THE DIFFERENT TYPES OF HYBRID CAR



Boosting power to the more traditional engines

Ferrari's hybrid LaFerrari uses an electric motor to provide an extra 160bhp to the 790bhp naturally aspirated V12 engine. Energy is cleverly re-harvested to the electric motor using KERS.



A moving alternative that's independent to the engine

Meanwhile, the McLaren P1 and the Porsche 918 (and most traditional hybrids such as the Toyota Prius) utilise an electric motor that can work independently of the engine for emission-free motoring. These cars can therefore drive right through central London without having to pay the daily congestion charge!



Hydrogen fuel: an alternative hybrid power source

Manufacturers such as Mercedes are creating completely hydrogen-powered vehicles that work by passing hydrogen through an internally mounted fuel-cell stack, mixing it with oxygen directly from the atmosphere to produce electricity. This electric power is then sent to motors to power each wheel.

032

SHOULD YOU STILL
BUY A HYBRID?

HYBRID VS ELECTRIC

WHAT'S THE DIFFERENCE?

COST EFFICIENCY

Petrol and diesel may be at the lowest it's been for nearly ten years, but having an engine means having more parts that will need constantly servicing.



VS



There's no engine to service, but charging your car at home each night (and perhaps in the city during the day) will have significant effects on your household electricity bill.

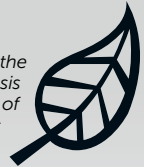
ENVIRONMENTAL IMPACT



While there's still an internal combustion engine in the car with an exhaust pipe attached, both the environment and us humans are at risk. Tesla is quick to point out that up to 30,000 deaths are caused each year because of air pollution.

VS

Sure, electric cars don't produce emissions that harm the ozone layer, but the batteries housed inside their chassis will be hazardous for the environment if not disposed of properly in their masses – something the government will need to consider and very soon.



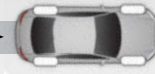
396 MILES | 222 MILES

RANGE



We managed **396** miles on one tank of fuel in the Panamera by using the electric motor around town. We would have got even more too by charging the car from the mains rather than via the engine!

VS



Our summer test in 2015 in a Tesla Model S gave us **220** miles of urban and motorway use before it needed to be recharged, despite having already re-harvested lost energy under braking.

CHARGE TIME



Hybrid and electric cars can be charged overnight of course, but if the batteries need a top up it can be done on the go with the engine – as showcased globally by the Toyota Prius, saving you time as you don't have to change your lifestyle around it. Winner!

VS

There's no engine to service, but charging your car at home each night (and perhaps in the city during the day) will have significant effects on your household electricity bill. To power the average electric car for 100 miles, around 30kWh is needed.



POWER

Hybrids such as the McLaren P1, Ferrari LaFerrari and Porsche 918 all produce near to 1,000bhp and sprint from zero to 62mph in around **2.6** seconds.



VS



There's less resistance to an electric car so these will be quicker over time. The Tesla Model S already sprints from zero to 62mph in just **2.8** seconds – despite weighing over two tonnes!

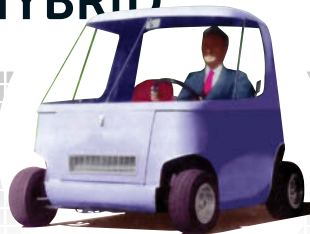
EVOLUTION OF THE HYBRID



1898

LOHNER-PORSCHE

Dr. Ferdinand Porsche built one of the first hybrid cars by using an internal combustion engine to spin a generator that powered motors located in the hubs of each wheel



1969

GM 512

This experimental hybrid car had a top speed of only 40mph thanks to a measly two-cylinder engine, but it could boast to run on pure electric power up to 10mph



1997

TOYOTA PRIUS

The world's most famous hybrid was first released in Japan some two years before schedule and in time for the Kyoto global warming conference. It's one of the cleanest cars ever in relation to smog emissions.



PORSCHE PANAMERA S E-HYBRID: THE VERDICT

Lee Sibley, editor of Porsche-only magazine Total 911, gives his thoughts on his seven-day road test of the hybrid Panamera

In a world where cars are getting faster, yet expected to be ever more environmentally aware, Porsche's hybrid concept is epic on paper: it's a 420hp car weighing 2.2 tonnes that's supposedly capable of 91mpg. At face value, there's nothing outwardly different about this elongated sports saloon: so where's the electric power?

The battery is positioned underneath the rear boot, which is great for two reasons: it's out of the way and it enhances a low centre of gravity for the Panamera, a crucial handling credential. The e-motor, as Porsche calls it, is candidly positioned between the conventional V6 engine and the eight-speed Tiptronic S automatic gearbox. So regardless of whether you're using e-power or the V6's grunt, power goes through the gearbox before being sent to the wheels. This gives a more traditional experience compared to a fully electric car such as the Tesla Model S, which doesn't use a gearbox (and is therefore more linear in its power delivery).

Climbing behind the wheel, the usual Porsche lavishness is apparent: there's cow hide everywhere and the sporty wheel is flanked by two elegantly weighted shift paddles to change gear, should I wish to overthrow the gearbox's choices. Peering into Porsche's famous five-dial instrument panel gives the first sign (from the interior, at least) that this German battle-axe is a little different from other cars on the road. All dial needles are green, and next to the traditional rev counter is an engine use pod. This was to be my main point of contact for my week with the Panamera, as it is here where I can see when and how the car is using its electric energy.

Turning the key to start the engine is bizarre. Nothing really happens. The Panamera's headlights come on and needles on the dashboard jump up and into position, telling me the car is ready. Yet there's no movement, just silence. Nevertheless, I engage first gear and pull away. This is because the Panamera S E-hybrid uses electric power to

pull away at all times, no calling on the engine until I push past the 30 per cent mark on the gas pedal (as indicated from the engine use dial). The Panamera glides along on electric power and, most impressively, the Michelin tyres are near silent.

Switching between full e-power and the engine involves a button prod, and the engine can charge the battery while moving, which is just as well as the punitive electric-only range was found to be just 12 miles in reality. All my economy saving on pure electric power was soon wiped out by the engine having to work extra hard to re-juice the batteries while propelling 2.2 tonnes of car along the road.

I managed 45mpg tiptoeing from Bournemouth to Reading, a 1.5hr journey using electric power in town and the V6 engine on motorways, some way off the 91mpg Porsche claim the car is capable of. And yet, this second-generation hybrid Panamera is a superb improvement over the first and Porsche's understanding of the technology will only get better.



1999

HONDA INSIGHT

Two years late, fellow Japanese car manufacturer Honda released the Insight – the first hybrid car to hit the mass market in the US, achieving a superb 70mph on the motorway.



2014

MCLAREN P1

The world's first one million-pound hypercar was also a plug-in hybrid, guaranteeing world-leading performance while still being able to amble about town on zero emissions.



2016

MITSUBISHI OUTLANDER

Due for release this year, Mitsubishi is claiming this hybrid four by four is capable of 140mpg, meaning hybrid drivers could go weeks without needing fuel if they stick to town driving.

6

UPGRADES TO REVAMP YOUR RIDE

Create your very own budget Bentley with these must-have in-car entertainment gadgets

In our contemporary world, it doesn't take long for audio technology inside even a modern car to become dated. It all began with the modest tape deck, but then came the CD player, quickly followed by graphic equalisers, surround sound, touch screens, all speedily complemented with wireless connectivity, voice command and even the internet itself. It's awesome, but the downside to this turbo-charging of in-vehicle gadgetry is that new tech gets old fast. You might think unless you own a Tesla, with its overnight software upgrades, it's impossible to upgrade to 2016's in-car tech, but you'd be happily mistaken. There is in fact a booming aftermarket specialising in bringing a little extra gadgetry to your chariot.

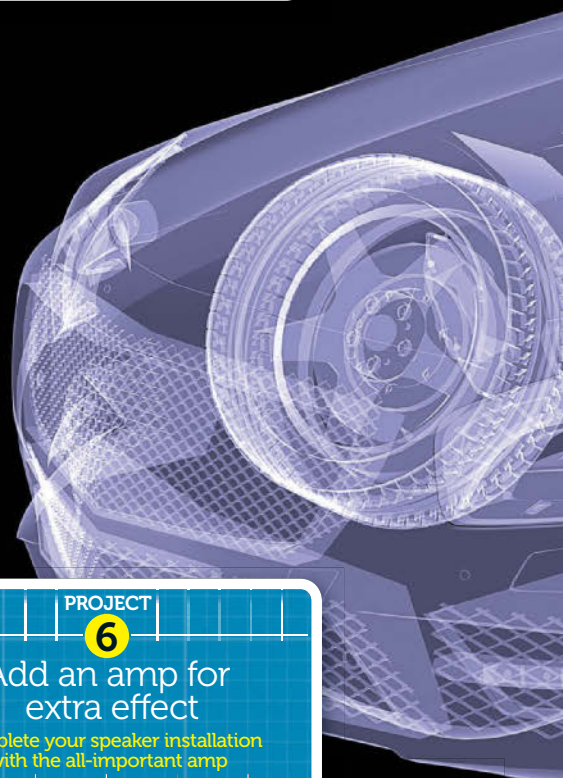


PROJECT

1

Install new speakers

Add a little boom to your beaten-up banger



PROJECT

6

Add an amp for extra effect

Complete your speaker installation with the all-important amp



PROJECT

2

Get an all-round sound
with door speakers

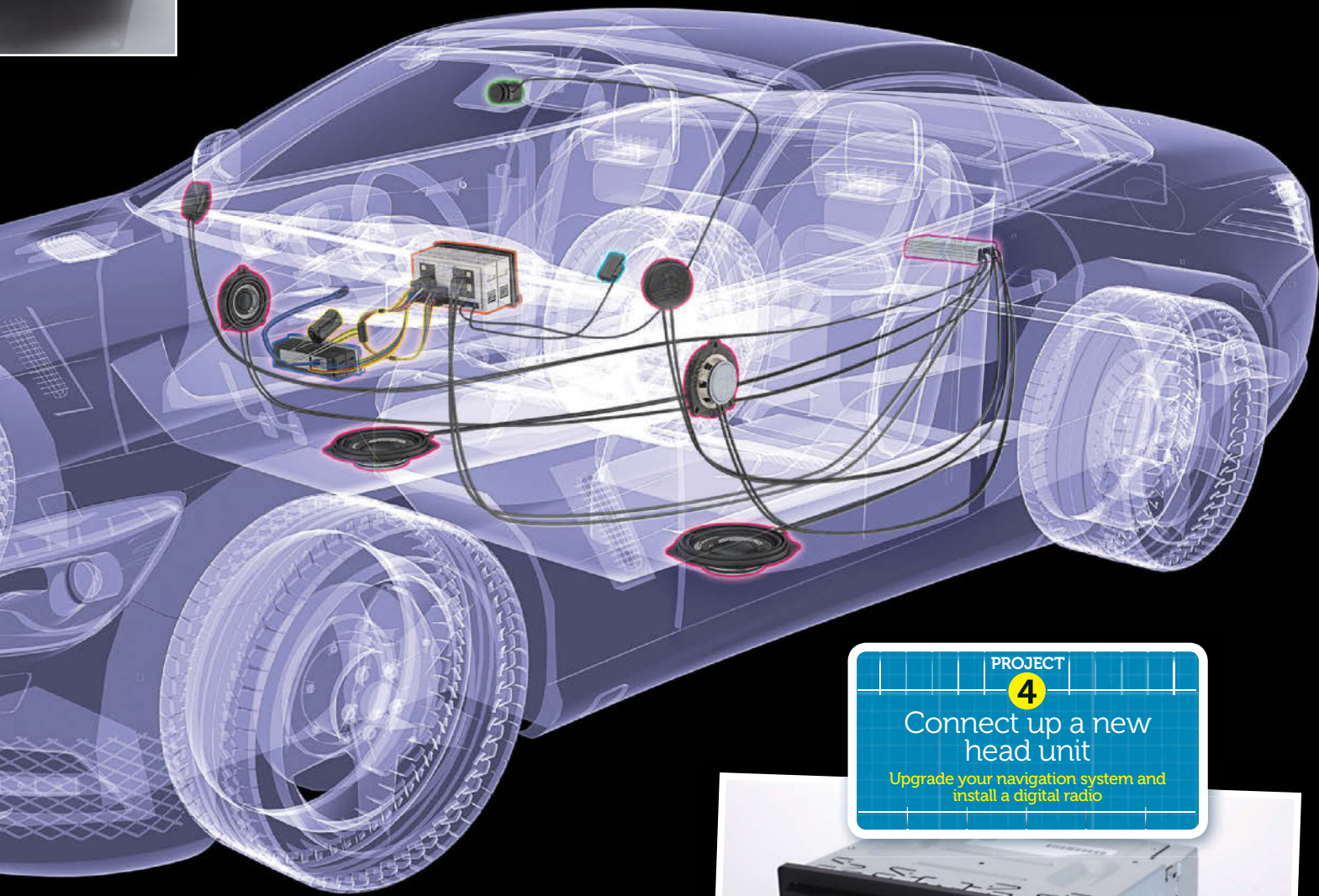
How-to guide for upgrading your
inner door speakers

PROJECT

5

Make and receive calls
on the go – safely!

Set up a Bluetooth
hands-free kit



PROJECT

3

Hit the high notes with
new tweeters

Replace your factory
standard treble speakers

PROJECT

4

Connect up a new
head unit

Upgrade your navigation system and
install a digital radio



UPGRADE YOUR AUDIO

Soup up your sound with this superb world-leading tech

The base of any good music

The woofers are the base of any speaker system (no pun intended). They produce sounds in the 60Hz-250Hz range, so without one you'll never get a decent bass response. The replacement BMW speakers are fitted with fibreglass cones and sealed in with black rubber surrounds: that means you'll never get a rattling, annoying sound when the bass starts to get *really* heavy. The speakers also use neodymium magnets – that means the sound is clearer and louder than you'd get with standard magnetic reactions.

£330 | \$478

celsusice.co.uk

BMW and Mini Replacement Speaker System

Designed to upgrade your whole sound system. Includes tweeters, midrange speakers, underseat subwoofers and crossovers.



1 INSTALL NEW SPEAKERS INTO YOUR OLD BANGER



01 Consider their placement

Work out the best place for your new speakers to live, bearing in mind that you want them to be easily upgradeable. We recommend your parcel shelf, though it will need reinforcing.



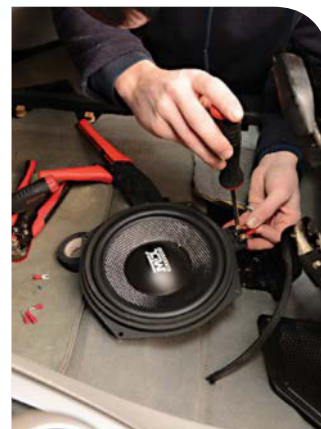
02 Access your old speakers

If you already have stock speakers in your car, then these will need to come out. Disconnect the car battery first, then remove any grilles or panels to get access to the speaker.



03 Remove old speakers

Now you have access to your old speakers, unscrew the bolts dotted around the speaker cone to free the whole item. Then unclip the wires from each terminal (there will likely be two).



04 Fit the aftermarket speakers

New speakers should clip into the existing terminals, but if you're fitting speakers in a new location, don't forget to run new wiring under the carpet and into the head unit via the back of the dashboard.

Don't forget about those mid-rangers

Mid-range speakers typically look like smaller woofers, but there's more going on under the sound-softening mesh than that: there's a reason most standard TVs and radios come with these fitted as standard. The replacement BMW speakers are 10cm across and come with fibreglass cones to help the sound travel better – fibreglass is used because it dampens sound better than a lot of other materials and generally goes towards producing a higher quality of general low-to-high sound.



Hit the high notes

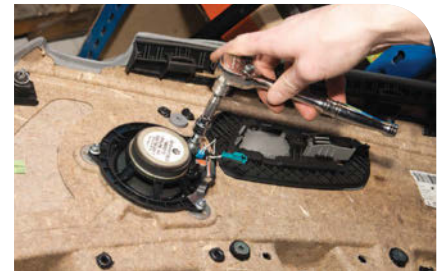
A tweeter is specifically designed to play high-end frequencies: from 200Hz to 20,000Hz. Car tweeters tend to use dome- or horn-type voicecoils – they're just better at getting the sound *out* that way and filling the space. The BMW replacement speakers have a diameter of 25mm and use softdome tech, which was actually invented to stop people at trade shows poking and breaking the voicecoil. The practical application of this? The speakers are resilient and can withstand a bashing or two if your car gets rocked.

2 GET AN ALL-ROUND SOUND WITH NEW DOOR SPEAKERS



01 Get access to the factory speakers

Access the factory components by removing the car's door card. This may involve removing caps and unscrewing it at the door's interior handles. The door card should just pop off.



02 Remove the original items

Now you have access to the factory speaker, simply free it from its hold to the door card by removing the three screws. Nice and easy! Once the speaker comes free, unclip the connection at its rear.



03 Secure the upgrades!

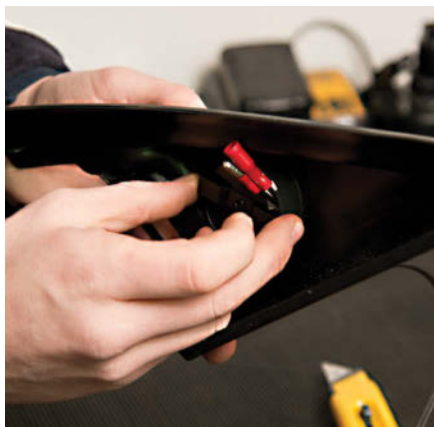
Now you just need to reverse the exercise for installation. Clip the car's wires into the new speaker's terminal, then screw it in place in the door using the same holes and screws, before replacing the door card.

3 TWEAK YOUR TWEETERS



01 Remove factory tweeters

These are usually found mounted in your dashboard, so pop open the covering grilles using a flathead screwdriver and unclip the tweeter from its connectors. These tweeters, or treble speakers, produce high audio frequencies, so even if you just upgrade these speakers, it can make a huge difference.



02 Connect your new tweeters

This is even simpler than step one. As long as you make sure to buy audio equipment that's specifically designed for your car, your aftermarket tweeters will be fitted with the exact connectors that you will need – simply clip these in. If you have any problems here, check that you're using compatible tweeters.



03 Refit the new tweeters

Now pop the new tweeter into the gap left by your factory item. If you're making a new home for your tweeter, you can either flush mount them in a door card or surface mount them on your car's A-pillar. If you're relocating them, then don't forget you will need to run more cables!

GET GLORIOUS VISUALS

This is surely the best upgrade you can lavish your car with, replacing your drab OEM head unit with a colourful, vibrant and media-savvy screen for relatively little outlay. For many, this is the pride and joy of any aftermarket system, as you can actively use this to flit between your media files, music preferences, audio settings and even display themes, every time you take a seat.

£720 | \$1,050

kenwood.com

**Kenwood DNX7150DAB
Navigation System**

4 Connect a new head unit



01 Remove your old head unit
Remove the negative terminal of your car battery first. Then pull out your existing head unit (it should have come with special forks to help prise it out of its dashboard housing). Remove all the wires from the rear of the head unit using the clip/unclip terminals.



02 Connect your new head unit
Your new head unit may clip straight in to your car's existing wiring harness. If not, you will need to wire up the new head unit's harness to the harness in your car by matching each cable to its reciprocating colour. Get crimping!



03 Install the unit into its new home
If the swap is like-for-like (eg, swapping a single-DIN unit for another single-DIN item), installation is a simple reversal of step one. If you're upgrading in size, you will need to install new housing to hold the unit.

THE BEST AMP GETS THE BEST RESULTS

Amplifiers multiply the input signals from your head unit to your speakers, making the sound both louder and clearer (they are commonly used to amplify subwoofer signals, which require a lot more power). If you don't invest in a good amp, then you can't expect to enjoy crystal clear tunes in your motor, regardless of whatever other tech you stuff it with.

Amps are classified by their channel, so you can either get monoblock (one channel), two channel or four channel products. Amps are also classified by their amplification, segmented down to classes A, B, AB and D according to their electrical characteristics.

As such, you should never judge an amp purely on its size and, similarly, don't just go for an amp with the biggest peak output, as different amps will suit different audio setups.

£175 | \$250

celsusice.co.uk

**The Thunder
1000.1 Amplifier**



Heat-dissipating form

Amps get hot and a good design can help reduce this heat. The Thunder 1000.1 does this with slats on its surface, providing a greater surface area coming into contact with the air

Surface-mount design

This resists vibrations for reliability under the most extreme conditions, ideal for an amp you want to transfer from car to car

Class D technology

A class D amplifier is the most efficient in terms of controlling power loss, especially during heat build-up, as the transistors inside (which amplify signals) are electrically switch-able; this is instead of linear gain devices that are used in class A, B or AB amps. Most amps these days are digital in their operation

Simple monoblock specification

The 1000.1 is a monoblock amp, meaning it uses one channel – this makes it the ideal partner to a good subwoofer



Enjoy a wider variety of radio stations with a DAB

GET DIGITAL RADIO IN YOUR CAR!

DAB opens your ears up to a wide range of music channels that are readily available at the push of a button, but to receive DAB in your car you will need to install an aerial. Choose a good location for the aerial on the exterior of your car; we recommend high up on the roof and near the back of the vehicle. Clean the roof where the aerial is to be placed and attach (it could be magnetic or you may need to glue it). You will then need to route the cable from the aerial into your head unit, which will involve tucking it out of sight via a door jam and, once in the car, under the carpet, all the way to the back of the head unit in the dashboard. It's a tricky process, but totally worth it in the end.

MAKE AND RECEIVE CALLS ON THE GO – SAFELY!

It's all very well turning your motor into a smartphone on wheels, but remember this: in most countries, actually using your phone at the wheel is illegal. So, is there any way to make and receive calls safely at the wheel? The answer lies in a good hands-free kit, which usually connects to your phone via the good old medium of Bluetooth. Safe and sound, quite literally.



£160 | \$250
parrot.com

Parrot MKi9200 Bluetooth Handsfree Kit V3

5 Introduce a hands-free kit to your motor

01 Get wired!

Although the system uses Bluetooth, to keep power running to the screen you need to plug it in. Some plug into a cigarette lighter or USB port, but some need to be wired to your head unit, which means taking your dashboard apart to hide away the wiring looms.

02 Click and connect

From here, using your hands-free system is simple. Turn the device on, pair it to your smartphone and you're ready to go. Most have generic voice recognition systems too, making it even easier for you to concentrate on the road instead of your call.

03 Need an update?

Devices such as this may require a software update from time to time to keep everything in good working order. To download the update file, plug your hands-free system into your computer via the USB port and follow the on-screen instructions.

6 ADD AN AMP FOR EXTRA EFFECT



01 Wire it up!

First, disconnect the negative terminal from your battery to stop a short circuit when running the power cable from the battery to the amp. You will then need to fit an inline fuse to keep the power in check.



02 Mount the amp

You can mount an amp pretty much anywhere in your car, though they are commonly found on the back of the rear seats in the boot or on a subwoofer box. This can be mounted with four simple screws.



03 Connect it

Once the amp is connected to the battery, it also needs a connection to the back of your head unit to receive signals. Expect to tuck a lot of wire under the carpet from the front to the back of your motor. A final connection to a subwoofer will do it.



04 Fine-tune the music

Once it's connected, you'll need to do some fine-tuning. This is done using the equaliser on your head unit as well as adjusting the gain controls on the amp. Use a bass-heavy song to test your subwoofer.

THE TECH YOUR CAR NEEDS RIGHT NOW

Extra add-ons to improve your car



EXTRA EYES ON THE ROAD

With over 500 accidents per day in the UK alone (and plenty of idiot drivers on the roads to boot), you need to be ready in case you and your pride and joy fall foul of yet another motoring statistic. This trick camera system from Road Angel provides on-board footage that's then ready to download to any computer when needed. Featuring high-resolution and real-time recordings, the Halo has your back, quite literally, as it comes with a rear-view camera and has parking mode to detect accidents should they occur when you're not with your vehicle. Neat!

Road Angel Halo road-angel.co.uk | £200 | \$290



AVOID SPEEDING TICKETS

If you're keen to make sure you stay on the right side of the law, especially when visiting a new area, then this gadget may well turn out to be your best mate. Mounted to your windscreen, it spills the beans on all the latest speed traps and safety cameras, ensuring you know exactly where they are even if you don't spot them yourself. You'll always be in the loop too, as the device constantly updates thanks to its built-in GSM chip, sharing data that's input by you and other users. And, before you ask, it is 100 per cent legal.

Road Angel Gem+ road-angel.co.uk | £179 | \$262



KEEP CLEAR OF EMERGENCY VEHICLES

A TETRA radio signal may not mean a lot to your average road user, but you might be interested to know that all emergency vehicles in the UK use them. Target BluEye merely intercepts these radio signals and lets you know how far away the emergency vehicle is by indicating its signal strength to you as a driver. It's completely legal and detects all emergency services, meaning that no matter how loud those sweet beats are in your car, you'll always be safely aware of that ambulance tearing down the street.

Target BluEye targetblueye.co.uk | £799 | \$1,164



BIG BASS FOR A LITTLE SPACE

Pretty much the antithesis of the MTX JackHammer (subwoofers for your car), this low-profile MicroSub delivers big bass for your music despite its size, meaning you can indulge in a truly sonorous experience no matter how small your car is. This boxed sub, which continually fools testers thanks to its size, has thin walls with extensive internal bracing to maximise internal air space – crucial for creating that resonating big bass sound.

JL Audio MicroSub jlaudio.co.uk | £238 | \$345

DROP BIGGER BASS THAN A NIGHTCLUB DJ

Simply put, this thing is crazy! Billed as the world's most lethal subwoofer, the bass from this huge 24-inch beauty is just fantastic. Standing at over three feet tall and weighing in at a mighty 400 pounds, your modest motor may need a few structural enhancements to support it – and that's if you can even fit it where it needs to go! Built to order, these Jackhammer super woofers utilise only the very best kit, including a 6.5-inch voice coil that can handle the anticipated high temperatures, as well as eight AWG set screw terminals (which are bigger than those used in most households) to ensure that a huge power cable can be bolted to it for minimal voltage loss. Its over-the-top attitude is half the reason it's so damn awesome, with its maximum RMS of 4,000 watts, it's more than enough to blast the very best vibes through your car and probably half your town.

MTX JackHammer
mtx.com | £6,900 | \$10,000



Wonder woofer

Morel offers a neodymium magnetic system, enabling high-power handling



STUNNING AUDIO IN A LIGHTWEIGHT DESIGN

If the massive JackHammer is a little impractical for you – which, let's be honest, it's pretty likely to be – might we suggest its polar opposite: Morel Virtus Nano speakers? With space-saving gadgets like these, you can still have powerful audio upgrades installed that don't take up too much room or cost the earth. These speakers need just a 17mm-mounting depth, so they'll fit pretty much anywhere in your car.

Morel Virtus Two-way Nano speakers
morelhifi.com | £337 | \$489

Acuflex tweeters

These 28mm treble speakers have Acuflex soft domes for a superior sound



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TEARING APART THE DUALSHOCK 4

The secrets of the Playstation 4's controller revealed

Standing proudly alongside the infamous little grey box that brought the world *Crash Bandicoot*, *FFVII* and *Gran Turismo* was the original PlayStation controller. Stickless and simple, this controller introduced the world to those soon-to-be famous icons: Square, Circle, X and Square. This was 1994, and only the start of the PlayStation pad's decades-long journey.

Continuing the trend of introducing new features, the DualShock 4 introduces a two-point capacitive touch pad on the front side of the controller (that also counts as a button when 'clicked'). This allows players more 'mouse-like' control on games. The pad also introduces an LED light bar that illuminates in various scenarios: usually, it'll light up in the colour of one of the four face buttons to identify you as player one, player two and so on.

This light bar was also a forward-thinking asset for VR: the PlayStation Camera will be able to track this bar and locate the position of your hands in VR when using the DualShock 4 – Sony's unique approach to the problem of control input when you've got a VR mask covering your eyes.

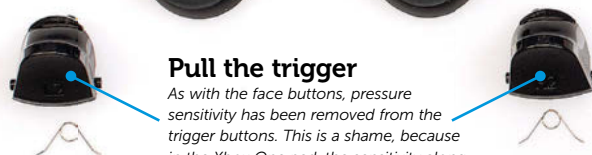
Thumbs down

Early models of the DS4's thumbsticks were subject to tearing, but don't worry: they're easy to replace!



Pull the trigger

As with the face buttons, pressure sensitivity has been removed from the trigger buttons. This is a shame, because in the Xbox One pad, the sensitivity along with trigger-specific haptic feedback feels wonderful when shooting or driving



Light 'em up

The light bar has its own mini circuit board to power the illumination. Different games use this in different ways, but it's not essential. You can disable the bar altogether and make your battery last a good deal longer



£50 | \$50

playstation.com

DualShock 4 Wireless Controller

Great for interacting with games, both traditionally and in more innovative ways, you can use it on PS4 and PC.

DUALSHOCK TO THE SYSTEM



1994

PlayStation Controller

Based on the basic button configuration of the Super NES pad, the PlayStation controller added an extra set of shoulder buttons so players could navigate the three-dimensional game environments that were becoming more popular on the PlayStation 1.



1997

DualShock

The main addition the DualShock brought was the vibration, which was powered by two motors in the palm grips/handles. Each motor was a different strength (the left-hand side was stronger) so games could modulate various levels of rumble, depending on the situation.



The DualShock 4 was designed by Sony with ergonomics and comfort in mind: that's why it feels so pleasant to hold!

A touching idea

The small sensor that sits under the plastic cover detects finger movement over the surface, enabling the controller to act as a touchpad. It also has two clickable inputs: left and right

Extra life

The pad ships with a 1,000mAh battery that will give you about six to seven hours life per charge. It's easily replaced with a 2,000mAh battery, though, if you're willing to pay £9 for a DualShock 3 battery...

A step backwards?

This is the first time since the DualShock 2 that a PlayStation controller does not have sensitivity sensors under the face buttons for hard and soft presses

"One of the most functional gaming controllers ever made"

Central circuit system

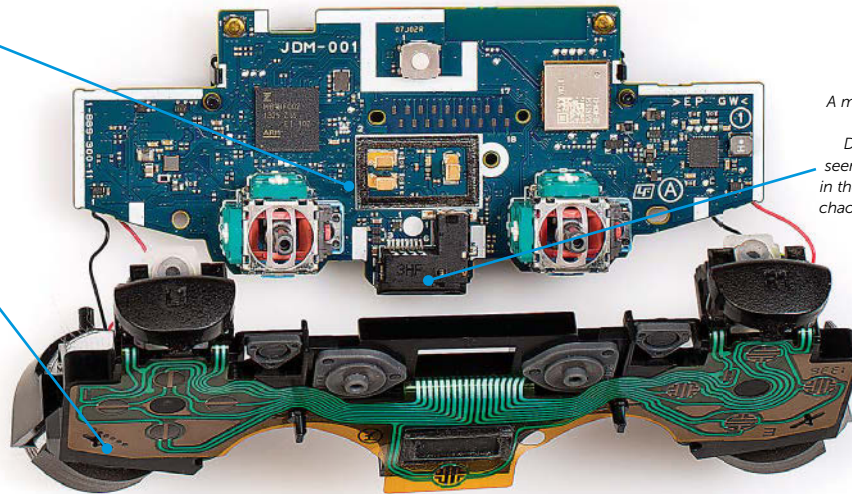
This is the brain of the pad, where all the split-second logistics occur. This can be taken away from the pad and used to make other hardware, such as fight sticks or custom controllers

Good vibrations

These motors – one featuring a three-ringed vibration motor, the other with a single ring – are triggered at certain points in the game and provide haptic feedback to the player. These also contain the six gyroscopes and accelerometers

Sounding off

A mini loudspeaker lets unique sounds play through the DualShock 4. This might not seem like too big of a deal, but in the midst of local multiplayer chaos, it's useful to know who's responsible for what!



2000

DualShock 2

The DualShock 2 didn't change too much as the model was upgraded for the PS2. It was lighter, though, and had one fewer screw holding it all together. It did introduce readable values on the buttons – meaning games could request you to push them harder or softer.



2008

DualShock 3

The PlayStation 3 iteration of the pad went fully wireless, powered by an internal lithium ion battery and introduced Bluetooth compatibility with other PlayStation products (the PSP Go, for example). The Sixaxis tech also enabled control via tilt.

REPLACE YOUR BROKEN THUMBSTICKS



01 Pry apart the casing

After taking the four 6.0mm screws holding the casing together out of the rear cover, you should begin prying the pad apart with the left shoulder. To do this, pinch the left shoulder and you'll see an opening appear on the right palm rest.



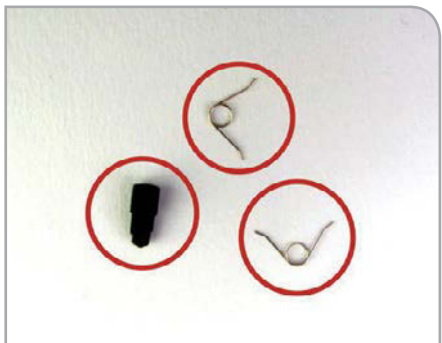
02 Split the case in two

You'll have made an opening above the light bar at the back of the device. Very carefully, split the two halves of the device apart – the device will still be held together by the circuit board ribbons, so make sure you don't pull it too hard.



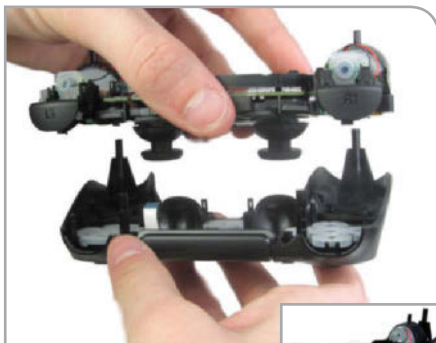
03 Remove the battery

Remove the motherboard ribbon by very gently pulling it out of its connection with your fingers. Once disconnected, place the top of the controller aside, and gently wiggle the battery plug from its housing. Lift and remove the battery.



04 Check your workstation

During the separation of the body, it's likely you'll dislodge both the 'Reset' button extension and the springs that make the triggers work. These can easily be put back into the pad once you're done, but make sure you know where they are – they're small and comparatively easy to miss.



05 Remove the motherboard

There's a single 6.0mm screw connecting the motherboard to the casing. *Carefully* unscrew it; doing it too hard or quick will thread the screw and make it impossible to remove. Once removed, take out the touchpad ribbon from the base of the case.



06 Replace the sticks

Once you've got the three parts of the controller separated (that's the front cover, back cover and motherboard), you can get to work properly. Support the motherboard with one hand and pull off the old sticks with the other. Don't worry about pulling hard; it requires a little force. Just a little, though.



07 Put it back together!

Click the new sticks onto the nodes the old ones sat on, and set about rebuilding the pad. You can basically follow these instructions in reverse to do that – just make sure you replace the motherboard/touchpad ribbons the right way round!



For more information on how to disassemble (and reassemble...) the DualShock 4, visit ifixit.com for repair guides, answers forums and tools.

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from all good
newsagents and
supermarkets

BRING YOUR DOODLES TO LIFE!

Lift your creations off the page with a 3D printer pen

For everyone who once truly was a child at heart, the 3Doodler is the stuff of dreams. It combines the best and brightest in 3D printing technology with the most basic of Biros. It's an electric pen that lets you pull your creations straight off the paper.

You don't have to be an artist to create amazing art. All you need to get started is the pen, some plastic strands and a surface to draw on. Unlike more advanced 3D printers, computers and software aren't necessary with the 3Doodler. The pen uses a tiny internal heater to melt the plastic, which then solidifies instantly as it comes out of the nozzle at the other end. It also acts as

a welder of sorts, which enables you to bind the strands together to create solid, sturdy structures.

After the huge success of their first 3D printing pen, 3Doodler decided to take it a couple of steps further with the 2.0. They took everything that was wrong with the first one (which wasn't much) and tried to fix it. The new 3Doodler is now half as heavy and less than a quarter of the size it was before, making it easier to use. For advanced users, there's also a manual temperature control so that you can make minor flow adjustments and new dual speed controls so you can doodle at your own pace.

"Pull your creations straight off the paper"

HOW TO GET STARTED WITH THE 3DOODLER



01 Get started

Plug in the 3Doodler and set the power switch to low or high – check which type of plastic you want to draw with and then set the temperature accordingly.



02 It's heating up in here

The 3Doodler will take one to two minutes to heat up after switching it on. Once it's hot, choose a coloured plastic strand and insert it into the top of the 3Doodler.



03 Now pick a speed setting

Use the fast and slow buttons on the side of the pen to choose a speed setting. The plastic will take roughly 30 to 40 seconds to extrude out of the nozzle of the pen.

04 Start drawing!

Begin doodling on a piece of paper. When you're feeling confident, have a go at creating lines off the paper to make a 3D structure.



05 Make adjustments

If you're having difficulty, try changing the settings. Double click the fast or slow button to get a continuous flow of plastic and single click to stop.

£100 | \$99

the3doodler.com

3Doodler 2.0

Draw in thin air and make stunning 3D creations with the world's first ever 3D printing pen. The 3Doodler 2.0 is smaller, lighter, quieter and unlike anything you have ever used.

START YOUR OWN 3D PROJECT



Doodles as decorations

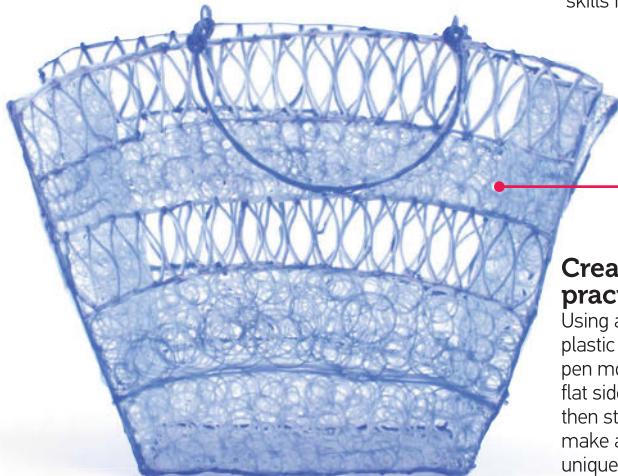
Print out a design stencil and 3Doodle on top. Use a variety of different coloured plastic strands so it looks exciting when the candlelight shines through.

Spice up gifts
Use the 3Doodler to turn ordinary objects into extraordinary gifts by doodling patterns and images onto plain photo frames, moneyboxes, coasters or even lampshades.



Become an architect

Challenge yourself by doodling famous landmarks like the Notre Dame, the Golden Gate Bridge, the Statue of Liberty or the Houses of Parliament. Test your skills further by increasing your speed.



Create more practical objects

Using a light-coloured plastic strand and intricate pen movements, create flat side and bottom panels then stick them together to make a very interesting and unique plastic handbag.

Choose your ink

The 3Doodler works with ABS plastics, the same material as used in 3D printers, as well as PLA, which is biodegradable, made from corn and has a lower melting temperature

Get a steady flow

The 3Doodler has two speed settings, fast and slow, which alter how rapidly the plastic is extruded from the nozzle. Beginners might want to start practising with the slower setting first



The basics of the pen

The plastic strand heats up as it passes through the body of the pen, making it pliable – it then cools rapidly once it leaves the nozzle, solidifying in thin air

Within the pen

The 3Doodler uses a tiny mains-powered electric heater to melt the plastic. An equally small fan-based cooling system is also contained within the body to stop it from overheating

Eject the plastic

Eject the plastic strand by holding down both speed settings at the same time. Once it stops reversing, pull it out with your hands

Crank up the heat

As well as setting the temperature to high or low, you can also adjust it manually and tweak the temperature plus or minus five degrees using the mini screwdriver included with the 3Doodler

050

THE new analogue
SMARTWATCH

THE ANALOGUE SMARTWATCH

The Withings Activité Steel is the Apple Watch for the people that don't want to brag

Smartwatches today all tick certain boxes when it comes to looks and functionality. Smart LED screens and notifications is the name of the game.

Then there is Withings, who have been doing things differently for two generations of wearables now and they're not changing their outlook for the this third generation either – the Activité Steel.

Parisian style, says the firm, is at the heart of the way this watch looks. Also at the centre is the idea that smartwatches, as of yet, aren't great to look at, which is why the Steel is an analogue watch with two physical, moving hands and a smaller secondary face. Its circular face is trimmed in steel (hence the name)

and it comes with a lightweight and very comfortable silicone strap.

Don't be fooled though, as the Activité Steel is much smarter than it looks – a scrolling wheel in the companion Health Mate app enables you to move the hands as if by magic. It's a neat party trick too!

The Steel is waterproof and houses a range of sophisticated sensors to track your walking, running, cycling and swimming. The second face on the watch is a subtle tracker of your progress to a step goal and, like everything the Steel does, it is extremely accurate.

This is the smartwatch genre stripped back, but thanks to the powerful companion app there's more to the Steel than meets the eye.

Sensors

The smart sensors within the Steel track your movement – including steps – as well as your calorie, running and swimming statistics.

There's also a silent alarm that vibrates to wake you

Analogue watch face

No annoyingly-bright LED display here, the Steel relies on physical watch hands, though they are still guided by the time that you set on the smartphone connected to the device

A leather-imitating strap

Slight and very comfortable, the smooth silicone strap that comes with the Steel nicely imitates the leather band of a traditional analogue watch

A battery life that can't be beaten

It's a traditional watch battery inside, which means a life of up to eight months – completely blowing every other wearable out of the water

£140 | \$170
withings.com

Withings Activité Steel

A lightweight smartwatch with an analogue watch face that links to your smartphone via Bluetooth, tracks movement and fitness, and vibrates for incoming notifications.

MAKING FRIENDS WITH HEALTH MATE

Thanks to wearables, we know what to expect from health and fitness apps these days. However, the Withings Health Mate app goes down a colourful and more conversational route when it comes to dealing with your data. Yes, as expected, there are charts to track your progress, but this app hands you badges for certain goals – a very good way of turning you into a fitness achievement hunter.

“Don’t be fooled though, as the Activité Steel is much smarter than it looks”



Steel casing

The key standout feature of the Steel is the metal casing that covers the watch face and buckle, offering something just that little more stylish

The face of your fitness coach

This smaller watch face is your fitness coach, showing your progress towards a predetermined step goal, 10,000 steps a day, for example

STANDING OUT IN ANALOGUE

The Activité Steel is the third generation of smartwatch from Withings and yet little has changed in terms of functionality. The core of the fitness and movement tracking remains and it is, as the name suggests, the steel finish that you find is the key difference between this and the previous watches: the Activité Pop and the Activité. The Pop has a silicone strap intended to be your companion for exercise, whereas the Activité has a leather strap that limits this versatility. The new Steel seeks to find the middle ground between being your sport companion and an elegant analogue watch.

THE TINY TECH TO SAVE YOU MONEY

The new smart tech to help transform your home

This year will undoubtedly be the year that smart home tech starts to take over living rooms all across the world. But for those of you who are a bit unsure as to how you should make the transition, the E-Sylife is on hand to help you establish your first foray into this exciting bit of gadgetry.

While it may just look like a fairly bland cube, this smart hub packed with Wi-Fi enabled trackers to monitor the living conditions in your home. Users can remotely connect to their E-Sylife and get instant reports on security breaches, indoor air quality and energy consumption.

The wireless control parameters of the unit enable additional E-Sylife modules to be connected, with some tailored to help you save money on energy bills and others built to keep your home safe. Energy modules connect to the ammeter, water and gas meters that power your home, with users able to remotely see the exact amount that is being used and instantly make changes. This is different to other security modules that simply look to instantly alert you to any problems in your home when you aren't there.

It's an easy system to set up and despite competition from a number of other smart hubs, the E-Sylife is one of the most complete systems we have ever seen.

Under pressure

A built-in pressure sensor is capable of not only alerting you to the air quality in your home, but also if there are rising carbon monoxide levels that could be lethal

NO MORE COSTLY BILLS

Although it isn't exactly plug and play, setting up the E-Sylife and attaching it to your energy systems takes just a few minutes. The changes are almost instant, as the E-Sylife app makes it easy to identify the areas that your energy consumption is costing you money. At first, you may find you will save only a few pounds or dollars, but adjusting the energy output through the app can help you save close to 15 per cent on your bills in the long run.

Sensor hub

The hub has three 15mm Wi-Fi enabled sensors that can be connected to any number of additional modules available through the E-Sylife system

£130 | \$190

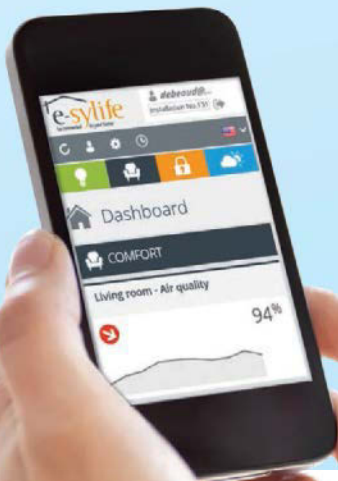
e-sylife.com

E-Sylife

A wireless tracking system that's built to help you monitor your home when you're at work, on holiday or anywhere else in the world.

Let there be light

The watt module wirelessly connects to the accompanying ammeter clamp that is placed at the hub of your mains electricity. In turn, it reports energy flow back to you



THE SMART SOLUTION FOR COMFORT

While it's possible to track the temperature, living conditions and pressure levels in any room you place the comfort module in, it's a bit redundant if your home doesn't have a way of filtering the air that comes in and out of it, such as an air-conditioning system. For those lucky enough to have this installed, the E-Sylife is a good way of identifying ways to improve the overall living conditions in individual rooms throughout your home.

All in the app

Tracking is all done through the custom dashboard of the app, but it's also the place to go if you want to adjust any of your smarthome gadgets or E-Sylife modules

3 MORE SMART HUBS TO GET YOU STARTED



Nest Thermostat

A programmable thermostat used to adjust core water and heating temperatures in your home. Use the accompanying app to track your energy usage.
£249 | \$249 | nest.com



Amazon Echo

The Echo is a hands-free, always-on hub that enables users to instantly stream music, perform web searches and control smart devices.
From £220 | \$180 | amazon.com



Almond 2015

A router-come-smart hub that connects to most third-party smart sensors while also connecting you to the internet through its on-board touch screen.
£78 | \$80 | securifi.com

054

google's pretender
TO THE TABLET CROWN

The Pixel C is designed for multi-angle functionality with an adjustable screen

Android Marshmallow

Though not desktop software – and sometimes it shows – the Pixel C is running the latest version of Android, which means it comes with Now on Tap for better contextual searches

Magnetic versatility

The magnets in the Pixel C and the hinged stand housed in the keyboard means it looks like a notebook one moment, then pull it apart and it's an upright tablet in another

Some LED style

The slim-line LED light panel on the rear of the tablet not only offers a little bit of extra style, but it's also a handy battery-life indicator

Processor

The Nvidia Tegra X1 and Intel Maxwell GPU make the Pixel C sharp when gaming as well as when jumping between apps and multitasking

£399 | \$499

pixel.google.com

Google Pixel C

A 10.2-inch tablet with one of the best and brightest screens around, a desktop-level processor and a smart keyboard accessory that can match any iPad, yet it's much cheaper.

USB-C

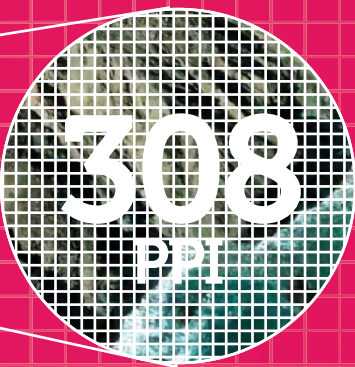
The new universal connection is also in place on Google's new Nexus phones, meaning just one cable and you can connect across devices when needed

Keyboard

Automatically synced once attached, the keyboard is also pleasantly robust as a typing experience on a tablet

GOOGLE'S PRETENDER TO THE TABLET CROWN

The Pixel C is a fully-fledged, Google-built disruptor



LIVING UP TO THE NAME

The Pixel C isn't just a name to crowbar this device in with the Chromebook Pixel, despite the dashes of similarity in style. This is a bright and vibrant screen and one that is best put to use with media: images and videos in particular look very good on the 10.2-inch screen thanks to the 25 per cent additional brightness, in comparison with some other tablets.

When Google makes tablets, they always involve a partner who actually puts together the hardware. Asus made the Nexus 7 and HTC put together the Nexus 9, but times (and indeed names) are now changing.

The Pixel C is Google-built from the ground up and the result looks and feels premium thanks to a brushed metal finish. However, the device also acts like a premium product thanks to a screen that lives up to the Pixel C name. The 10.2-inch display houses more than four million pixels at 308 per inch and it is also significantly brighter than most other tablets you will encounter. So while the Bluetooth keyboard hints at a very professional usage for

the Pixel C – and the magnetic connection is very slick – some of the best times you have with this device might just be for entertainment and consuming media.

It's been built for gaming because some of that weight you feel is Nvidia's Tegra X1 processor – that's a desktop-class processor made for better performance. This is performance that shows up when you're gaming or quickly jumping between apps.

You will be doing that a lot too because this definitely feels like a multi-tasker; the speed is there for productivity, but so is the power for the more fun things in tablet life.

Apple and Microsoft heads are right to turn.

GOOGLE ENDORSES THE KEYBOARD TAKEOVER

Microsoft's Surface and the idea of a hybrid device that could be both a tablet and a laptop has been given huge boost thanks to the launch of the iPad Pro.

Apple admits the idea works and wants a piece of the market thanks to the desktop-like features of the Pro.

The Pixel C is in a similar vein. The magnetic connection that holds the keyboard in place as a screen cover is brilliantly flipped when you slide the tablet off and reattach it. The hinge means it's suddenly an adjustable stand in one fluid motion, yet it still looks like a notebook. The keyboard is proving a slick addition.



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google's pretender
TO THE TABLET CROWN

WHICH TWO-IN-ONE TABLET IS BEST FOR YOU?



iPAD PRO

With a screen that can rival the Pixel in terms of brightness and sharpness, the iPad Pro is aimed at a slightly more creative audience. With the Apple Pencil as a prominent accessory and the hyper-sensitive touch display included, this is the tablet for the artistic – whether it be professional use or for a hobby.

Processing power is still extremely good and the size of the screen means that you view full-size websites as opposed to mobile versions. Battery life matches that of previous iPad generations.

£679 | £799 | apple.com

VS

MICROSOFT PRO SURFACE 4

Microsoft's newest offering to the two-in-one tablet market is a chunky, dense device that is in keeping with the brand's 'laptop' aesthetic. The kickstand can be set at an impressive variety of angles – always important with these devices – and is as good as an all-in-one media device as it is a workstation. It's a half-inch smaller than its Apple rival, but has greater PPI (read: resolution). The Surface Pen (which ships with every unit) features 1024 angles of touch sensitivity, which is better than any of the competition.

£749 | \$899 | microsoft.com

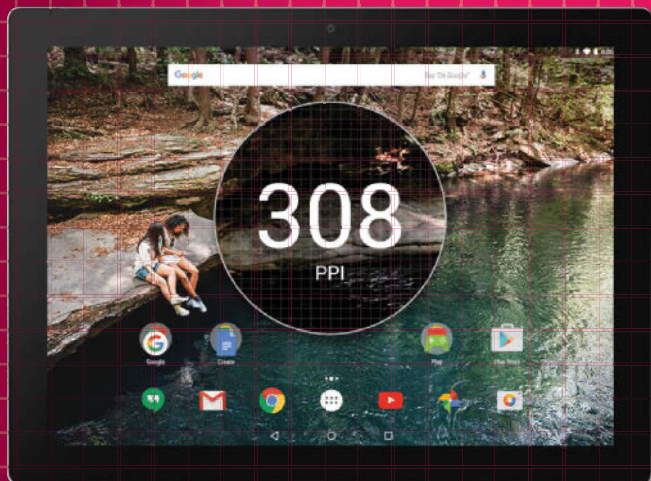


VS

PIXEL C

Powerful, stylish and robust, the Pixel C makes a lot of sense as a productivity tool. It's got the display and speed to handle image editing and multitasking with ease. However, Android Marshmallow isn't always the most comfortable to use or completely seamless desktop-style software and the keyboard lacks quite a number of shortcuts that both the Surface 3 and the iPad Pro have. Yet it is still a very good basic productivity tool – be it for word processing or general organisation. The price makes it a very competitive choice too, especially when compared to the iPad.

£399 | \$499 | pixel.google.com



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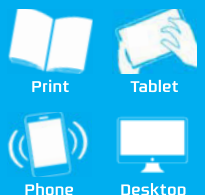
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058 | THIS computer
IS ONLY THIS BIG!

THIS COMPUTER IS ONLY **THIS BIG!**



Google's new PC will fit in your pocket

It looks like a slightly big USB flash drive, but it's so much more than that. The Chromebit has all the DNA of a desktop, but without taking up anywhere near the same amount of space as any of those underpowered Netbooks or Google-owned Chromeboxes.

This little stick can turn any monitor or display with a HDMI input into a computer. Everything you need to stream Spotify or

Netflix, write up documents or browse the web comes pre-installed. So whether you want to work on the go or turn any TV into a smart TV, the Chromebit will help you out.

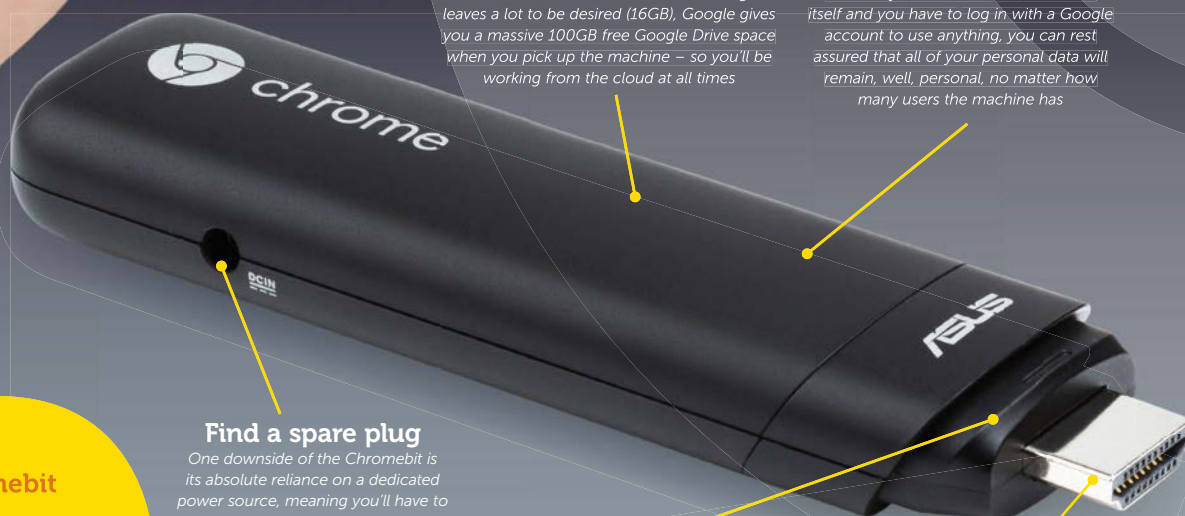
It runs on Chrome OS though, which is locked off, so you can't download any apps that aren't owned by Google to the stick. Thankfully, all the web apps you can add into Chrome itself survive, so you have a lot of options *within* the web app, but this stick is only meant for light computing, rather than being an all-out desktop replacement.

Lack of space inside

Because the Chromebit's internal storage leaves a lot to be desired (16GB), Google gives you a massive 100GB free Google Drive space when you pick up the machine – so you'll be working from the cloud at all times

Privacy protection

Since very little is stored to the device itself and you have to log in with a Google account to use anything, you can rest assured that all of your personal data will remain, well, personal, no matter how many users the machine has



£90 | \$85
asus.com

Asus Chromebit

A small, but mighty computer on a slim stick that's perfect for anyone who travels around a lot and needs to turn any television or monitor at a moment's notice into a pop-up work station.

Find a spare plug

One downside of the Chromebit is its absolute reliance on a dedicated power source, meaning you'll have to carry a power cable with you if you want to use it

Get connected

You will need either a USB hub or a selection of Bluetooth gadgets in order to use the Chromebit as it comes with just one USB port, which is not enough to pair up the necessary keyboard and mouse

Find the HDMI port

Just pop off the lid and slot the Chromebit into your TV's HDMI slot – straight away the machine will boot and you will be able to log in using your details

How does it compare?

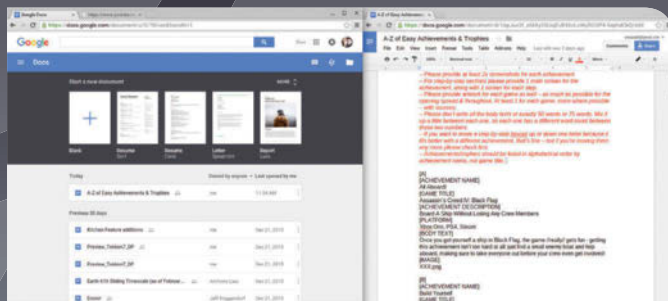
Asus Chromebit	Intel Compute Stick	Lenovo Ideacentre 300
DIMENSIONS		
123 x 31 x 17 mm	103 x 37 x 12 mm	100 x 38 x 15 mm
WEIGHT		
75g	54g	50g
OPERATING SYSTEM		
Chrome OS	Windows 8.1 with Bing 32-Bit Edition	Windows 8.1 with Bing 32-Bit Edition
CPU		
1.8GHz Rockchip quad-core processor	Intel Atom Z3735F 1.33GHz quad-core processor	Intel Atom Z3735F 1.33GHz processor
BLUETOOTH		
Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
STORAGE OPTIONS		
USB 2.0	USB 2.0 Micro SD slot	USB 2.0 Micro SD slot
ON-BOARD STORAGE		
16GB SSD	32GB SSD	32GB SSD
GRAPHICS		
Integrated Rockchip Mali T764 quad core	64MB (dedicated) Intel HD Graphics	64MB (dedicated) Intel HD Graphics
RAM		
2GB RAM	2GB DDR3 SDRAM	2GB DDR3 SDRAM



Reach around

The Chromebit comes with a series of gadgets to circumvent a common problem with HDMI ports: space. One is a flexible plastic input that enables even the most awkward ports to be accessed, the other is a simple one-foot HDMI extension lead.

WHAT YOU CAN DO ON CHROME OS



OFFICE WORK

With direct access to Google Docs and Gmail, Google OS basically replaces the entire Windows Office gamut – and it's all totally free to use.



VIDEO STREAMING

Though you can stream 4K YouTube videos, the Chromebit is limited to outputting at 1080p. It never stutters though, which is very impressive.



WEB BROWSING

It wouldn't be called the Chromebit without, well, Chrome. Browsing is a cinch and everything Flash-based works wonderfully without pausing when using the little device.



PRESENTATIONS

A more specialist use, but if you need to turn a TV into a display (if you're exhibiting at an event, for example) you can easily use Google Slides.

HOW TO GET THE ULTIMATE WIRELESS SPEAKER SETUP

Which wireless speaker is designed for you?

It's hard to fathom how dramatically the music industry has changed over the years; what's more, how consumers enjoy their music has evolved rapidly with the digital age too. Popping down to your local music store to buy the album that everyone is talking about is a thing of the past.

In the age of streaming services like Spotify, Rdio and Rhapsody, music has well and truly gone digital. Your old, dusty CD player is truly obsolete. What everyone wants these days is a Bluetooth speaker to add to their home-entertainment system.

The problem is, there are thousands of speakers out there, all boasting to be the best. At Gadget we take pride in giving you the best advice, so we have delved into the market and tested some of the finest wireless speakers known to audiophiles so you can listen to your music without tripping over wires. You're guaranteed to find the perfect speaker for you!

BLUETOOTH VS WI-FI: THE BIG BATTLE

The biggest decision you need to make is whether to choose a Bluetooth or Wi-Fi speaker. Generally speaking, Bluetooth is universal. Every device has it and this means you won't have a problem connecting to any Bluetooth speaker (the setup tends to be a lot easier too). Quality can be very good, but you are limited to a ten-metre range, but fortunately it is portable. Wi-Fi isn't as compatible (Apple's AirPlay is restricted to just Apple Mac and iOS devices), but it offers lossless audio quality.



PROS & CONS

A quick look at the advantages and disadvantages of Bluetooth and Wi-Fi



BLUETOOTH

PRO

Bluetooth gives you great portability – you can take it anywhere with you.

PRO

Bluetooth is a universal technology available on virtually any modern device.



CON

You can suffer from Bluetooth dropouts, depending on where you place the speaker.

CON

There are different standards of Bluetooth as this will affect your sound quality.

WI-FI

PRO

Great connectivity as a Wi-Fi speaker will cover the entire range of your Wi-Fi network.

PRO

Audio signals over Wi-Fi use lossless codec, resulting in no loss of audio fidelity.

CON

Different data formatting is used between different devices, eg Apple and Android.

CON

First setting up a Wi-Fi speaker can sometimes be a convoluted experience.



DO YOU STILL NEED A WI-FI BRIDGE?

Until recently, you needed a Wi-Fi bridge if you wanted to connect multiple speakers to your Wi-Fi network. The bridge usually came in the form of a small box that was positioned in the middle of your router and speakers. This created a false network for connecting multiple speakers. Getting started with a multi-room audio system is now extremely simple and, because wireless networks are quicker and more reliable, a Wi-Fi bridge is virtually obsolete. Bridge pioneers, Sonos, dropped theirs in 2014.

HOW TO SET UP A SONOS SPEAKER

01 Get the app

Once you've plugged in the speaker, the rest is completed through an app. Download the Sonos Controller app, it's free and essential for getting started.

02 Standard setup

Tap 'Set up a new Sonos System', then choose Standard Setup. The speaker will flash a white light. Once it turns green, tap Next and select your speaker type from the menu.

03 Connect to Wi-Fi

Press and release the buttons shown, the light will flash orange. Tap Next, open your device's Wi-Fi menu and select Sonos. Head to the app and connect to your home network.

£429 | \$500
sonos.com
Sonos PLAY:5

HOW EASY IS IT TO STREAM MUSIC OVER WIRELESS SPEAKERS?

Your main concern here is checking whether the Wi-Fi speaker you have your eye on is compatible with your devices and the streaming services you use. Some speakers, like Philips' multi-room units, work with just Spotify, while Sonos has only recently offered Apple Music support in beta. You need to be very thorough when doing your research! If you have a really old speaker system, you can connect a device like the Gramofon via the auxiliary input jack and turn any speaker into a wireless speaker.



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HOW TO GET THE ULTIMATE
WIRELESS SPEAKER SETUP

THE STYLE ICON

No list of high-end speakers would be complete without an entry from Bang & Olufsen. The B&O Play A6 speaker is an all-in-one music system that fills any room with signature-Scandinavian sound. Coated in a beautiful wool-blend fabric, the A6 looks the part in any modern living room. It's packed with the latest gesture-based controls, so you can control the speakers with a simple hand movement.

The A6 is a speaker perfect for showing off – and one that's also compatible with AirPlay, Bluetooth, Wi-Fi and DLNA.

£799 | \$999

beoplay.com

B&O Play A6

Presets for great performance

You will get amazing sound no matter where you place the A6 speaker, simply by selecting one of three predefined settings: wall, corner or free

Multit-room

The A6 features BeoLink Multi-room tech that unites your B&O PLAY and Bang & Olufsen products into one wireless system

Gesture controls

You don't need your phone to control the A6. Swipe left and right to alter volume, hold to mute and touch to change tracks

Fabulous fabrics

High-end manufacturer Kvadrat has partnered with B&O Play to coat the A6 in wool to provide excellent acoustic transparency

THE MOST FUTURISTIC

Looking like something from the future, audio kings Bowers & Wilkins' Zeppelin speaker has been a market leader for many years now. Its 2015 refresh cemented its place at the top of the class, combining cutting-edge design and great loud sound to add a real touch of genuine quality to a saturated speaker market. The Zeppelin was always known for its representation of delicate vocals and acoustics, but the new 150mm subwoofer (with its own dedicated amp) offers some serious power. A speaker to please even the pickiest of ears!

£499 | \$700

bowers-wilkins.co.uk

**Bowers & Wilkins
Zeppelin**

Long subwoofer

The subwoofer inside the Zeppelin uses a long-throw voice coil for deep, clear bass even at a seriously high volume

Audiophile sound

All five internal drivers are individually driven by dedicated bespoke-audiophile class D amplifiers, to create great sound output

Fewer vibrations

The new Zeppelin speaker is made from a 50 per cent thicker reinforced cabinet to ensure unwanted vibrations are kept to a minimum

Controlled performance

Every fine detail is accounted for here – each midrange driver, for example, features fixed suspension transducers for controlled behaviour

HOW TO CHOOSE THE PERFECT SPEAKER

FOR GOOD SOUND QUALITY

If you want audiophile quality, then look no further than a Wi-Fi speaker. The range is greater, there are no obstacles at all and the quality is lossless. If you want to go really loud, check whether a speaker has a built-in amp. Woofers and tweeters are essentially for all-round audio performance.

WHEN IS THE PRICE RIGHT

If you're after a portable Bluetooth speaker, you will find some great options for under £200. Wireless speakers will fetch much more, but the quality of sound is generally superior. Design wise, they are products to lust over too. There will be options for all prices, but invariably quality always comes at a price.



Versatile playback
Digital Optical and Coax outputs, in addition to an analogue Preamp out, makes the Vena a truly versatile control unit

Amplifier
The Quad Vena has an integrated amplifier that delivers 45 watts per channel and will go as loud as 108dB

£540 | \$770
quad-hifi.co.uk
Quad Vena

AptX codec
It does support the aptX priority codec for high-quality wireless delivery, but the Bluetooth version is only last-generation 3.0

Compact design
Space-conscious audiophiles out there will appreciate the new compact design, yet enjoy the classical design at the same time

GET THE MOST ORIGINAL SOUND

Quad is a company that has prided itself on reproducing as close to original sound as possible since 1936.

For companies with years of heritage, the wireless revolution has seen them having to quickly adapt. Traditionally, you couldn't get audiophile standards without wires. Times are changing fast though and Quad's Vena amplifier

is testament to that. A truly modern experience, the Vena is a match to a wide range of digital and analogue sources.

The design remains extremely classical and the sound quality is never sacrificed for the convenience of Bluetooth. You can even buy a pair of Quad speakers to complete the ultimate audio setup.



DIGITAL TO ANALOGUE

A digital to analogue converter (DAC) converts digital data into an analogue signal. The Quad Vena's DAC is needed to convert the digital signal to analogue, drive a loudspeaker amplifier and produce sound (analogue air-pressure waves). Vena's built-in DAC incorporates the same high-performance 24-bit/192kHz chipset used in the company's flagship Platinum CD player. This is thoroughbred engineering that uses complex equipment to ensure there is no musical degradation at all.

CHOOSE CONNECTIVITY

Your connectivity options come down to two main standards: Bluetooth or wireless. Be sure to check the compatibility before you buy. For example, if you own an Android device, don't buy an AirPlay-only speaker. Also check what streaming services the speaker will connect to as some have exclusive deals to be wary of.

WHAT'S ON THE WISH LIST

Every speaker comes with a wide range of features and choosing one comes down to what you want from the speaker. If it's a high-end speaker, 360-degree sound and area presets will be top of your buying list, while rugged design and long battery will top a portable wish list. It's a personal choice!

A LONG-LASTING BATTERY LIFE

Portable speakers have come a long way when it comes to battery life. The average length between charges used to be six hours, but you will get an average of ten hours with the latest models. If portability is a key selling point for you, you can find portable speakers that will go for over 20 hours.

THE *BEST SOUNDING* PORTABLE SPEAKER



£80 | \$149

denon.co.uk

Denon Envaya Mini

Portability has traditionally come at the expense of sound quality in the market, but not when it comes to the Hi-Fi legend, Denon, with over 100 years in the business.

Denon's Envaya Mini speaker packs an almighty punch for its size. It may be a little nondescript to look at, but what comes out of it, is a cultured sound that can go really, really big! Denon has packed the Envaya Mini with a huge range of the very latest cutting-edge technologies and the results are spectacular.

Digital processing

Digital treble processing enhances high-frequency detail and clarity, meaning reproduction of digital files is sumptuously crisp

Good things in small packages

The Envaya widens the 3D audio image to produce more spacious music, film and gaming soundtracks. All inside something so small? Wow!

Intelligent sound

Denon's own signal-processing technologies provide intelligent sound performance from any output source. This is the future!

Punchy bass

With dual 40mm full-range drivers accompanied by a 40 by 83mm passive radiator, the sound is well balanced and highlighted by a punchy bass

THE *BEST LOOKING* SPEAKER

One way of standing out from the crowd is to accompany a great-sounding speaker with a stunning, eye-popping design. That's exactly what KEF set out to do when it acquired the services of multiple award-winning cult British designer Ross Lovegrove. The result is a speaker that brings style and class into the portable Bluetooth category.

Even at £300 you're getting so much bang for your buck. Sound is crystal clear and detailed no matter what you're listening to, and the sculpted design just screams quality. We can't recommend this enough.

£300 | \$350

kef.com

KEF Muo

Aluminium casing

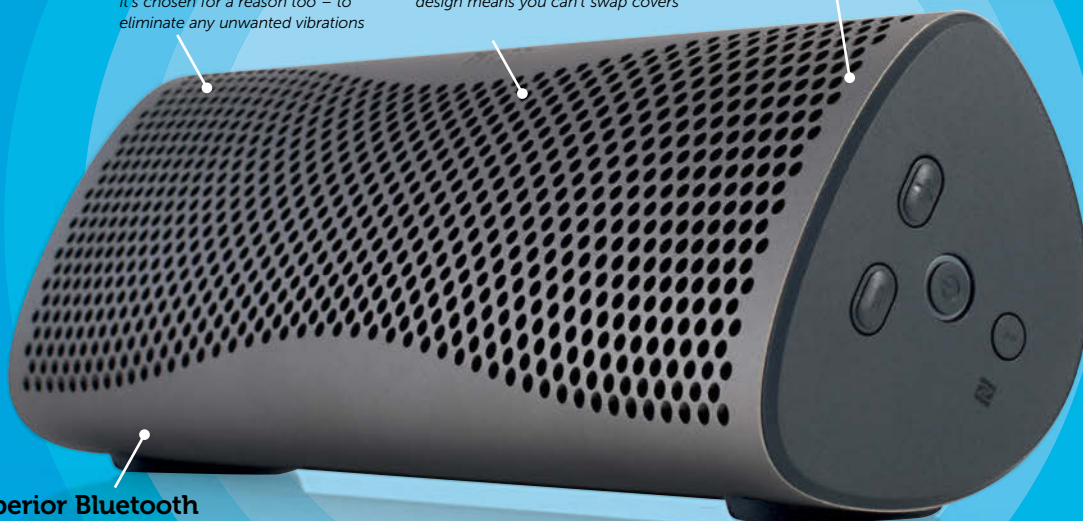
Aluminium always screams of quality and this outer shell is no different. It's chosen for a reason too – to eliminate any unwanted vibrations

Multicoloured

You can get the KEF Muo speaker in five different colours. The unibody design means you can't swap covers

Happy feet

The speaker's little rubber feet do more than prevent scratches to your coffee table – by angling the speaker upwards very slightly, it makes for better sound distribution



Superior Bluetooth

Inside that svelte body with Bluetooth 4.0 connectivity is aptX technology. To us mere mortals, that's superior quality with a compatible source

BEST BATTERY SPEAKER

A standard Bluetooth speaker will last for around ten hours between charges, but the Riva Turbo X doubles that and then does even more. Its 26-hour playtime may well be beaten by some obscure model, but its bold sound output puts it in a league of its own. This speaker goes really loud – perfect for powering a party late into the night.

Turbo mode

If you want things to go really loud, activate the Turbo mode to play up to 100dB. The clever bass compression protects it from sound damage

£250 | \$299
rivaaudio.com

Riva Turbo X



Vinyl playback

The Turbo X's Phono mode is well suited to vinyl playback as long as the turntable has a phono pre-amp built in. It will certainly save on space!

Clever charging

As well as delivering on its promise of 26 hours of playback, the RIVA speaker lets you charge your devices with minimal impact on the battery itself

Robust casing

Shaped like an elongated grenade, the STK Flasko is coated in an ultra-tough plastic that is designed to survive even in the harshest of environments

Universal compatibility

If your primary device has Bluetooth (if it doesn't – what are you playing at!) then you will be able to play all your tunes through the Flasko

Perfect backpack companion

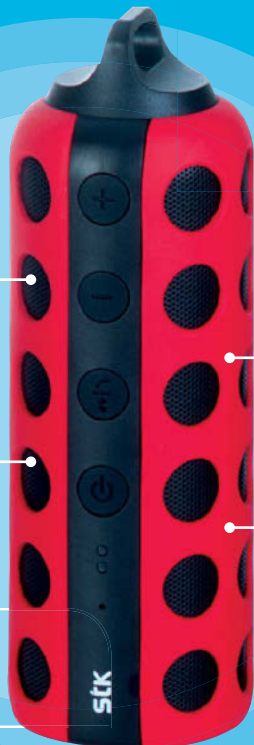
You'll find a very handy carry clip and bottle opener (yes, really) at the top of the speaker – perfect for attaching to a festival backpack

Certified IPX5

The Flasko is certified IPX5. This means it's splash proof, so a rain shower won't do it any harm. Just don't dunk it in the bath!

£50 | \$70
stk-acc.com

STK Flasko



MOST PORTABLE

Libratone surprised us in 2015 by releasing a Mini version of its celebrated Zipp speaker.

Luckily, the trademark rich sound is still there, with the Zipp dispersing sound waves in multiple directions for a fully immersive listening experience. It is certainly a speaker to proudly show off and one that you can easily transport thanks to its leather handle.

360-degree sound

It doesn't matter where you place the Zipp because it offers Libratone's FullRoom sound for a completely immersive experience

£179 | \$200
libratone.com

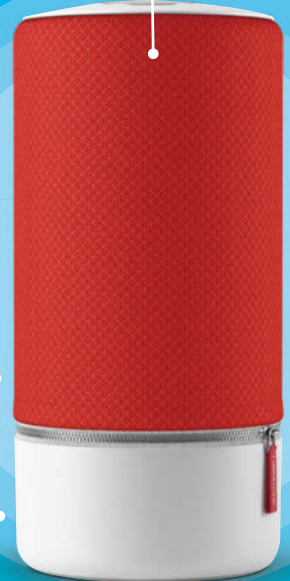
Libratone Zipp Mini

Beautiful and customisable design

Libratone continues the Scandinavian path of stunning design. The Mini is desirable and you can even change the colour of its cover

Personal audio experience

Libratone ships the Mini with its SoundSpaces technology too, which means you will be treated to portable multi-room technology and personalised sound



THE MOST RUGGED SPEAKER

Some Bluetooth speakers that fall under the portable category don't fill you with much confidence when you chuck them in a bag and head out to the great outdoors.

If you want to take a speaker to the beach, the park or even a music festival, what you really need is a bulletproof casing like STK's Flasko offering. For just £50, you get a super-rugged speaker that is tough enough to withstand the rain and any knocks and bumps that comes its way.

066 | WIN LIBRATONE
speakers

WIN LIBRATONE SPEAKERS

Assemble your own sound system
with these brand new loudspeakers

WORTH
£577



To help you get started with your own wireless hi-fi system, we've teamed up with Libratone to give away three speakers. As well as two Libratone Zipp Minis – our recommended pick for portability – we also have a larger Libratone Zipp for you to win.

While most multi-room speakers are designed to be static, Libratone's new system gives you the freedom to move speakers from room to room. You can also link them; the SoundSpace Link can connect up to six speakers per group – eight groups on a wireless network – supporting up to 16 speakers in total throughout your

house. Both speakers also work across either Wi-Fi or Bluetooth, so they can stream anything from music, podcasts and internet radio stations to videos, Netflix and even e-books. Libratone's Zipp speakers work with all your favourite online services, but are also optimised for Spotify Connect, Apple Music and AirPlay.

While the £179 Zipp Mini has a 3-inch neodymium woofer, 1-inch tweeter and 360-degree reflector for room-filling sound, the 26-centimetre Libratone priced at £219 is tripped out with a 4-inch woofer, two tweeters, and the 360-degree reflector.



FOR YOUR CHANCE TO WIN A LIBRATONE ZIPP OR
ZIPP MINI SPEAKER, ANSWER THE FOLLOWING QUESTION:
WHAT IS THE MAXIMUM NUMBER OF SPEAKERS YOU CAN
YOU CONNECT USING LIBRATONE'S SOUNDSPACE LINK?

A. 6 B. 8 C. 16

Enter today at **www.gadgetdaily.xyz**

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SAY GOODBYE TO SHAKY VIDEO

Drone tech reinvents the selfie stick

Action footage of people hurtling down ski slopes, kick-flipping skateboards or just going about their day can be fun – if you can see it. First-person video is ruined all too often by jerky footage, but, having attached cameras to flying machines for years, drone-maker DJI thinks it can remove the shakiness of your videos with its new Osmo selfie stick.

The handheld camera is capable of shooting 4K video, snapping 12MP images and the sensor has a 90-degree field of view, akin to what you'd find on DJI's Inspire drone series. Most importantly, as the Osmo includes the same three-axis gimbal that's used to keep drone cameras steady when in flight. So no matter the direction and movement, the camera won't move in the slightest with the gimbal moving in its place. By tapping on the trigger (located on the handle just below the gimbal), it will move the camera into different orientations, but without the blurriness and distortion you would normally find when using handheld cameras.

Thanks to the Osmo's clever curvature, all the controls are instantly in front of you. Your thumb will be able to easily reach for the power button, while there's also a flat joystick for manoeuvring the camera and a separate button for switching between video recording and snapping photos. Easy, right?



£550 | \$650
dji.com

DJI Osmo

A handheld camera mounted on a three-axis gimbal to provide a smooth way of snapping images at any required angle.

PERFECT PANOS

A built-in motor to the rear of the camera enables the Osmo to not only circle 360 degrees and capture amazing panoramic shots, it also provides enough power for the camera to spin independently. The single-speed setting of the motor permits the picture to be recorded at a steady rate, without any glaring errors appearing in the finished product.



Total app control

The accompanying phone mount and dedicated app are best used to not only edit the camera settings, but also as a viewfinder for lining up the perfect shot

"First-person video is ruined all too often by jerky footage"



STEADY AS YOU GO

The killer feature of the Osmo is its three-axis gimbal, which cancels out any shaking from your hand to guarantee completely straight and stable images every time. The bracket holding the gimbal in place moves with the motion of your arm, without actually moving the camera itself. Movements can be as dynamic as you want with the bracket realigning itself at all times to keep the camera central and still. Not only is it a big plus for taking some snaps, it also enables flawless 4K video recording.



Rotating camera

A rear motor helps to independently spin the camera a complete 360 degrees and improve the quality of your panoramic shots

Slo-mo fun

As well as snapping 4K images, the Osmo can record 120fps videos to help capture slow-motion material

Cinema-quality stabilisation

Not only does the three-axis gimbal hold the camera in place, it absorbs all jarring motions to keep the movements smooth and steady

Switch to selfie mode

A quick tap on the trigger will switch to a different shooting mode. Options include selfie, flashlight and underslung mode

Take the perfect shot

By using the on-board joystick, users can perfectly capture stunning panning shots and adjust tilt angles



070 | smart
insoles



How many calories are you burning?

A built-in accelerometer keeps a precise count of the number of steps you take. This is converted into the distance you have covered and the calories you have burned

Turn up the heat on your cold feet

Individually control the temperature of your insoles. Is your left foot always cold? Push up the slider to add extra warmth!

Get connected to your insole

Charge up your insoles, input your details and automatically connect both left and right insoles via Bluetooth 4.0

£150 | \$199

digitsole.com

Digitsole

Smarter than your average insole, the Digitsole lets you connect to your smartphone via Bluetooth and its very own app. Track your steps and turn up the heat for warm and cosy feet.

STICK IT TO THE COLD WITH DIGITSOLE'S SMART INSOLES

Monitor calorie-burn and heat your feet with this secret personal smart trainer

Need to keep your feet warm and toasty?

Track your walking activity? Want to find out how many calories you are burning? Well, the multi-talented Digitsole can do all of this for you and track it on your smartphone.

No longer do you need an extra pair of socks to keep your feet warm in the cold weather. Slip in the Digitsoles – make sure you get the right size! – download the app and get connected via Bluetooth.

Once you're connected to your shoes (well, your insoles), there is the opportunity to take control of its properties. Both insoles, for example, can be individually controlled via the app, so if you're in need of one

particularly hot foot, Digitsole has it covered; simply use the slider control to change the desired temperature. Getting to choose the perfect personalised temperature, especially in the cold, is something that many will love and we were certainly thankful for it.

However, the Digitsole isn't just a foot warmer; it's much smarter than that. As well as keeping your feet warm, it tracks the number of steps you take, making it a very reliable pedometer. And what does it do with this information? It combines it with personal stats and calculates how many calories you are burning. Keep your eyes on the app – it's where the action's at.



Shock to the system

Sitting on the top layer and at the heel is the Digitsole's SHS system. This uses pads on two layers to reduce the impact on the user's foot, heel and muscles

Hidden tech

Sitting between the flex zone layer and the Poron TX3 layer lie the electronics that bring the Digitsole to life. The main box contains the Bluetooth and pressure sensors, along with a connected heat pad

Get some support

The top layer of the Digitsole incorporates what is known as ergonomic support technology. This offers support to the natural arch of the foot and gives a snugger fit around the heel

Creating comfort

The Digitsole uses three main layers to ensure user comfort. The bottom layer uses Neotech for strength, the middle is Poron TX3 for shock absorption and a PU Soft Touch layer for comfort and heat distribution

6 hours
BATTERY
LIFE

21,000
steps

Number of steps you
can take in this time

1,000 to
2,000

How many calories
this would burn

Flexible footwear

To ensure improved comfort, this layer has a flex zone. This is a set of specially designed grooves to ensure the sole bends as you walk

Keep on running

The power for the Digitsole is provided by an internal battery, which sits inside the electronics box. This is charged via a USB port on the side of the sole and has a six-hour battery life

REBOOTING THE SHOE

Do you wish that you owned a pair of self-lacing Nikes like Marty McFly in *Back To The Future II*? Enter the Digitsole Smartshoe 01s. As well as tracking your steps, heating your feet like the insoles, and working with your smartphone, these futuristic-looking moonboots are shock-absorbent and charge wirelessly. And here's the McFly bit: they also automatically tighten around your ankle, so they fit you perfectly. Though are still being tested, Digitsole has released 1,000 Smartshoe 01s to buy from its website for €450 (around £340/\$490).

If you like the idea but not the design, Digitsole is also developing more subtly advanced smart sneakers and high-heel shoes.



072

THE SILVER SURFER
SMARTPHONE£160 | \$235
doro.co.uk**Doro Liberto
820 Mini***A simplified Android phone
with a Remote Assistance
button, the Doro Liberto
is aimed at smartphone
beginners and is perfect for
the elderly.*

THE SILVER SURFER SMARTPHONE

Does the Doro Liberto 820 Mini have everything an older person needs in a smartphone?

If you find it difficult to keep up with technology, it can easily leave you behind – and smartphones are perhaps more rapidly evolving than we realise. Most of us find our smartphones user-friendly enough, but if you're buying your first one in 2016, it's a daunting product for *any* beginner to start learning. But let us put your concerns aside; Doro's Liberto 820 is perfectly designed for any first-time buyers, aimed specifically at an

older customer, yet it doesn't scrimp on the essentials: is this the perfect way to keep in touch with your grandparents?

You can download apps from Google Play, customise the homescreen to add your most-used contacts or apps, and you can even shoot pictures with an 8MP camera. The Doro Liberto 820 feels similar to other Android phones, only with bigger buttons and a reduced resolution. There's a Remote

Assistance button on the back of the phone too, which can ring up to five designated numbers in the case of an emergency.

The Liberto has everything that an elderly person might want in a phone, along with a fair few indispensable functions for all beginners. There perhaps isn't a more user-friendly smartphone than this one on the market: your parents and grandparents will wonder how they ever lived without one.

Easy-to-shoot camera

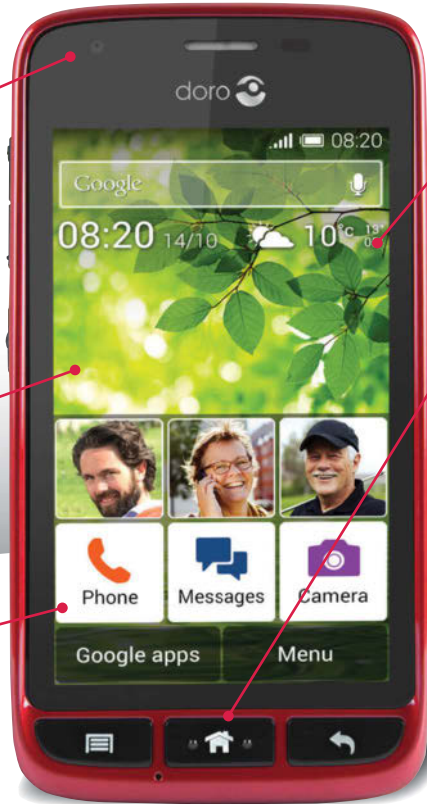
The Liberto 820 Mini comes equipped with an 8MP camera on the back of the phone – pictures can be shot with the shutter button on the side of the phone

Customisable homescreen

Add whichever shortcuts you like to the homescreen of the Liberto phone – whether they are apps or contacts' faces – and set your own background

Apps

Use the Android Google Play store to download apps to the phone. The Liberto has no trouble loading games or catch-up television app



Remote-assistance button

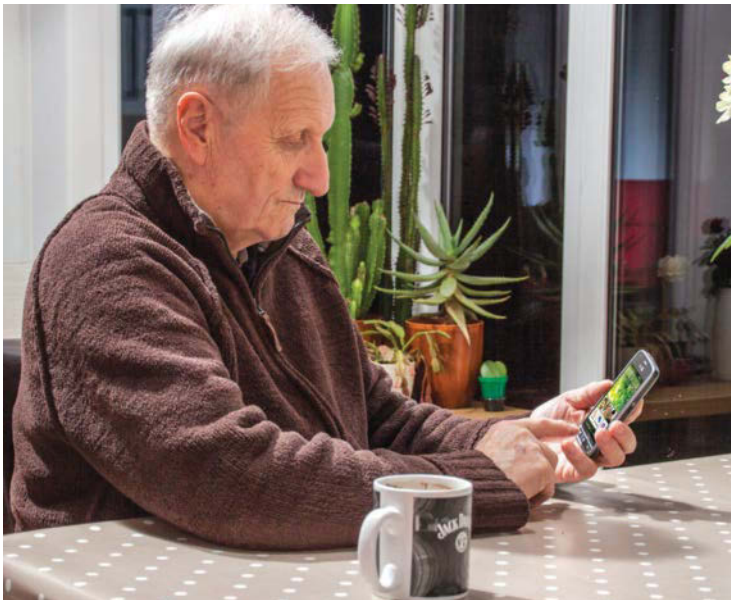
The remote assistance button located on the back side of the phone can be pressed either once or three times to dial five numbers until one answers

A smart dock

The dock is a great place to store your phone on charge, but it doubles up as a device for making video calls or watching TV too

Tactile buttons

Like some other Android products available, there are three shortcut buttons along the bottom of the Liberto for ease of use, only they're much bigger, making it easier to flick to home, menu and back



THE GRANDAD TEST

Derek Parker
71, Dorset

"It's light, isn't it?"
I like that. And it's not too wide to

hold. It's fairly easy to use the screen, but I don't know what all the pictures [app icons] mean. And I can see the buttons enough, but I have big fingers so I hit the wrong buttons sometimes. The stand it comes with is nice to dock it to and I can sit the phone down so I can watch it on the table. I don't use apps on phones, so I don't

know much about that; I use phones to make calls!

"It's easier for me to hold it with both hands and take a picture, rather than one hand and poking the screen, and when I want to watch a film or watch a video clip I can change the volume easily enough. My grip isn't what it was, so this is important to me, I don't want to drop anything expensive. I like it. It's better than my old phone. Can I have it?"



With its 'soft touch coating', the Doro is great if you have concerns about grip

Music while on the move

Thread the individual pieces of the circuit into the plastic casing after it has been assembled to let you easily take your synthesiser out and about



It's alive!

To get your circuit functioning, connect a nine-volt battery to the battery clip; remember the red wire is positive and the black is negative



The storage centre

The 10uF Electrolytic Capacitor is used for storing big charges of energy. Remember that the side with the white stripe indicates it's the negative leg of the component

Avoid explosive accidents

Resistors are important in circuits as they restrict the flow of electrical current and essentially stop everything from quite literally blowing up right in your face

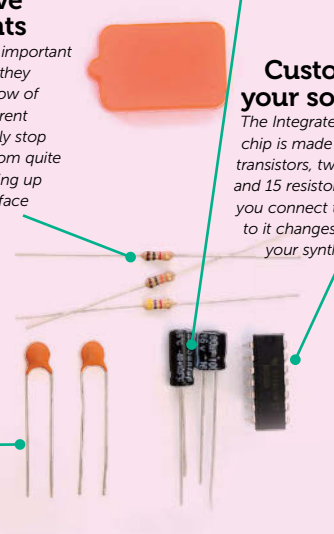
Customise your sounds

The Integrated Circuit chip is made up of 25 transistors, two diodes and 15 resistors – how you connect the wires to it changes the way your synth sounds



Releasing charge at will

The two 10nF Ceramic Capacitors store charge until they are completely full, before releasing it all in one go. Be wary of their placement for proper operation



CREATE YOUR OWN

Build your very own DIY synthesiser

Traditionally, if you wanted to replicate the synthesised sounds of Kraftwerk you either needed to know your way around a soldering iron or have pretty deep pockets to buy the necessary tools and software. However, thanks to the manufacturer Technology Will Save Us, the DIY Synth Kit lets any music enthusiast and maker build their very own custom amplifier and essentially turn any surface into a speaker.

Everything comes in the package and there's no soldering required; you just sit down with the components, build yourself a basic circuit and jump right into the fun of warping energy currents to create awesome electronica. It works pretty well to be fair – not to mention it provides a great base for expansion in the future – you see, everything can be modified and upgraded once you have the basic understanding of how the electronics function. The kit walks you through how to create three basic synthesisers, though this can be easily used as the building blocks of something more unique that's your own creation. Get building and get creating with this great DIY kit, all you need is a vision!

£23 | \$30

techwillsaveus.com

DIY Synth Kit

Build yourself a custom synthesiser and start creating electronic music with this very easy to customise and use DIY Synth kit.





Warping the beat

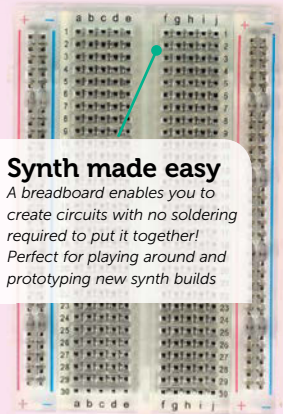
This lone Potentiometer works in a similar fashion to the two 470K Linear Potentiometers, but has a lower resistance range, broadening the range of sound you can create

Power in your hands

The Potentiometer is a hand-controlled resistor, so as you turn the knobs it increases and decreases the resistance from the device, warping the sounds you make

Get live and loud

Your synthesiser wouldn't be much good without one of these: the eight-ohm loud speaker is where the signals from the circuit board are turned into audio



Synth made easy

A breadboard enables you to create circuits with no soldering required to put it together! Perfect for playing around and prototyping new synth builds



Get wired up

All of the wires you need to connect the different components of your circuit to bring your synthesiser to life come packaged in the box

ELECTRONIC MUSIC

4 TIPS FOR MAKING YOUR SYNTH

01 Everything is in the box

Inside the DIY Synth Kit you'll find *almost* everything you need to start driving your housemates up the wall with your own brand of electronics. Get your hands on some double-sided tape and a nine-volt battery to get started.

02 Reading is key

This is without question the easiest way to build yourself a synthesiser, but that doesn't mean you can wing it. Play close attention to the included user guide as it will walk you through the basics of circuit creation and distortion.

03 Pay attention to the wiring

The kit lets you create three different synth sounds and this all comes down to the wiring. Pay extra close attention to the placement of the wiring before you start putting in the components.

04 How to make it louder

Fix the completed device either in the cardboard box the kit came packaged with or in some custom housing to make your synthesiser sound louder and fuller.



076 | READERS' SURVEY

Join our Gadget Reader Panel today!

Take our 3-minute survey at www.gadgetdaily.xyz/survey and win a place on our panel



We love writing **Gadget** and hope you enjoy reading it just as much. To make sure we're producing you the best possible magazine, we want to ask you what you would like to see in future issues. By answering just a few quick questions, you could really help us – you might even be selected to join our **Gadget** reader panel!

Jack Parsons
Editor



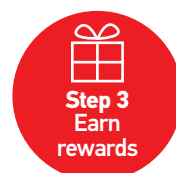
Join our panel and help us make the magazine even better!



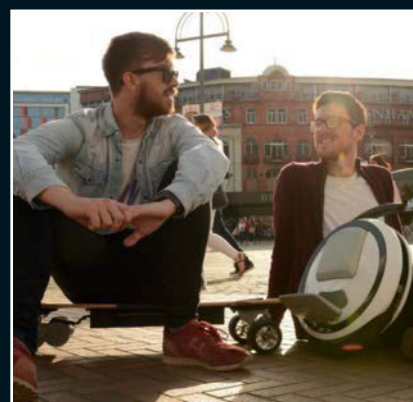


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ARE DRONES ABOVE THE LAW?

As drones invade prisons, get weaponised, and become tools of surveillance, **Gadget** investigates the laws that govern them and the companies that are making the tech safe

This is the year that the law will catch up with technology

From 'hoverboards' to hacking, autonomous self-driving cars to invasions of privacy, last year was a big one for technological advances, and not always for the right reasons: we saw celebrities have their private photobanks published online, the world's first self-driving car accident and myriad injuries occur thanks to those uber-modern Segway-inspired devices everyone was rocking late last year.



We're seeing more and more drones take to the skies, but how can authorities police the ever-increasing number of UAVs?

But – as the law bends and shifts to adapt to these rapidly evolving advances in new tech – there's one place that's *desperate* for more control over tech: the skies. There is already a pretty significant drone crime problem in the UK – multiple prisons have had issues with the unmanned aircraft smuggling mobile phones and drugs to inmates held inside the compounds. We aren't sure how many of these drops have actually been successful (it's the sort of data the police aren't keen to release), but in October 2015, nine drones were found inside prison walls, supposedly after having been loaded up with contraband. The very fact that this sort of thing is even capable of happening points to a broader problem: with great technological power comes great responsibility. And right now, in a legal sense, neither the government nor the public really knows how to treat drones.

But the integrity of the prison system is only the first problem facing drones and drone hobbyists in the UK: acts of voyeurism, invasions of privacy, terrorism activities and airport security are increasingly becoming issues for governments around the world to



The new Parrot Disco is designed for speed, but its new automated flying features and rotor-free design also make it safer to use

deal with. Added to that, you've got health and safety issues to contend with – may have just announced its first rotor-less drone (much less likely to cause injury than it's bladed stablemates), but most drones still pose a risk: a helicopter blade spinning at a high RPM could cause some damage, no matter how small the device it's attached to.

When you've got the US introducing controls and restrictions over who can buy and operate drones before anything like that is introduced for guns, you begin to understand the importance of this issue. The UK is may even introduce a drone register, in the spirit of the way that gun licences work in England; you'd have to be included on a formal list of fliers should you wish to operate a drone anywhere in UK airspace.

So, for the thousands of people that were given/gave themselves a drone between Christmas and New Year – and drones being the hot new gadget, there were a lot of them – there are a few new rules that must be adhered to if flying a drone is on their 2016 To-Do list. This all forms part of what the UK government and the Civil Aviation

“The UK may introduce a drone register, in the spirit of the way that gun licences work”

Authority (CAA) calls a 'dronecode' that's been specifically drawn up to ensure the safety of all drone pilots and all the general public.

This 'dronecode' is largely common sense – entries like 'make sure you can see your drone at all times' and 'keep the drone away from aircraft, helicopters, airports and airfields' go without saying, really. But there are some more specific entries in the code that begin to tap into what we find truly interesting: the ethics of drone-flying.

'Drones fitted with cameras must not be flown within 50 meters of people, vehicles, buildings or structures or over congested areas or large gatherings such as concerts or sports events' reads one entry. There are strong influences of copyright law in that statement: if a drone is recording/streaming to you, and you're recording a football game,



Kickstarter project Fleye is a drone fitted with a shielded propeller to prevent accidents



say, or an open air concert, whoever holds the legal rights to broadcast that event will automatically have the rights to sue you if you share any of that footage. The same goes with the general public: if you produce a video without requesting the explicit release rights of anyone whose likeness you capture, you're technically breaking the law.

How do authorities plan to monitor and enforce this drone code, then? At the moment it seems like an overwhelming task, considering just how prevalent drones have become, and so quickly. Unlike a lot of tech, drones became available to the public at the same time as they became available to governments and authorities – creating a state where the police have been unavoidably lagging behind when it comes to actually monitoring fliers. That's all changing now, though, as police forces

throughout the world are starting to use their own drones to combat the public's drones.

The UK police force has agreed to begin using unmanned aerial vehicles to tackle various operations: from observing burglaries, to aiding police on seizure missions; monitoring protests to deploying for search-and-rescue efforts. Of the 43 territorial police forces in England and Wales, 12 will begin to phase in drone ops – replacing the need for helicopter and canine patrols, in theory. The scheme will be initiated across the country if these localised pilot schemes are a success.

This throws up some morally and legally questionable issues, though: for the police to effectively use drones as an enforcement tool, officers would have to fly in the face of their own rules – hovering over highly congested areas, going within 50 metres of any individual, and using them to fly over crowds at commercial events.

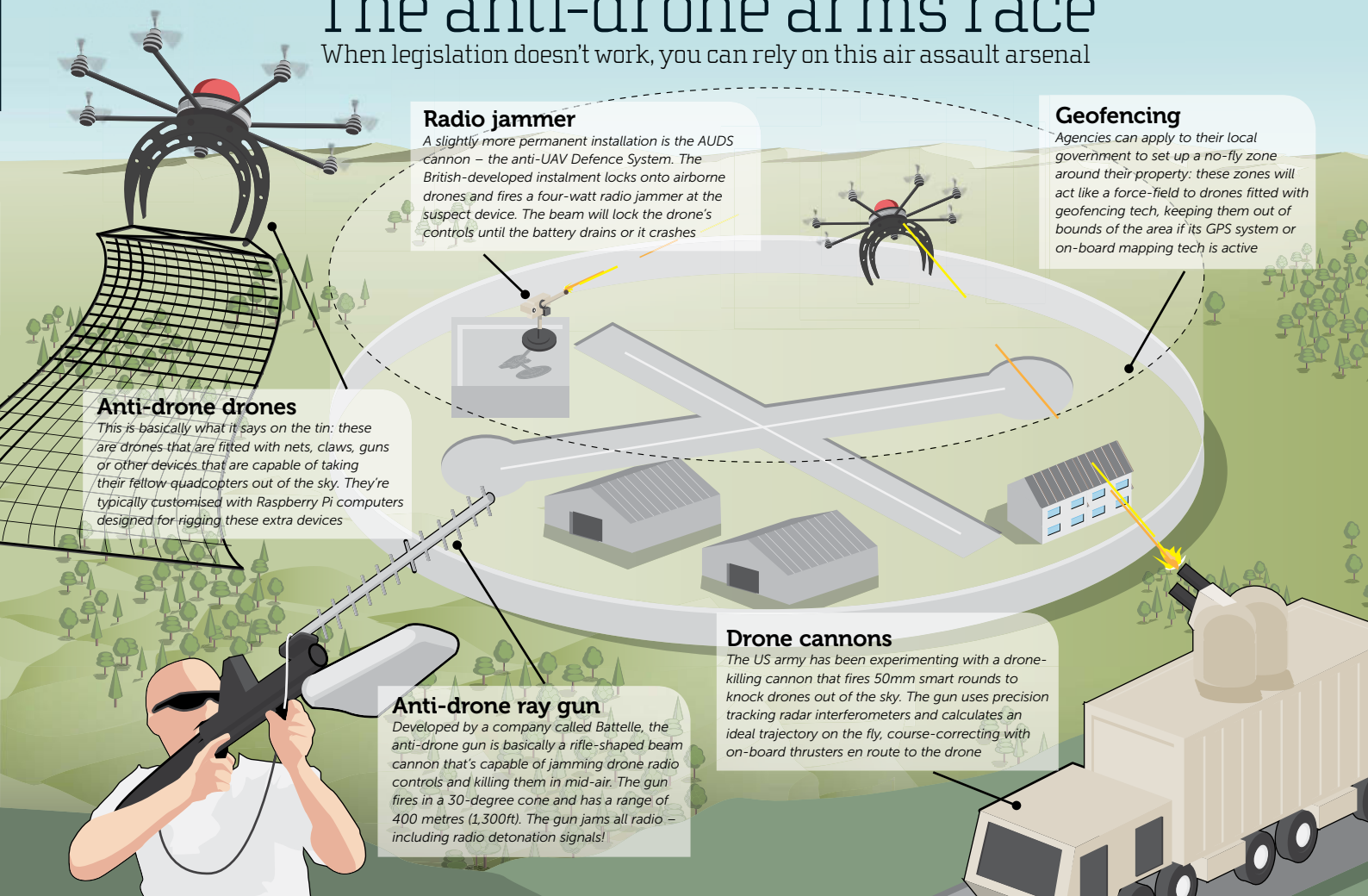
When questioned about the use of police drones in public areas in the UK, Steve Barry – the National Police Chief's Councillor for drone-related issues, told *The Times* that "[drones] can be efficient and effective – if



Police agencies around the world are getting used to combatting drones their own way

The anti-drone arms race

When legislation doesn't work, you can rely on this air assault arsenal



Radio jammer

A slightly more permanent installation is the AUDS cannon – the anti-UAV Defence System. The British-developed instalment locks onto airborne drones and fires a four-watt radio jammer at the suspect device. The beam will lock the drone's controls until the battery drains or it crashes

Geofencing

Agencies can apply to their local government to set up a no-fly zone around their property: these zones will act like a force-field to drones fitted with geofencing tech, keeping them out of bounds of the area if its GPS system or on-board mapping tech is active

Anti-drone drones

This is basically what it says on the tin: these are drones that are fitted with nets, claws, guns or other devices that are capable of taking their fellow quadcopters out of the sky. They're typically customised with Raspberry Pi computers designed for rigging these extra devices

Drone cannons

The US army has been experimenting with a drone-killing cannon that fires 50mm smart rounds to knock drones out of the sky. The gun uses precision tracking radar interferometers and calculates an ideal trajectory on the fly, course-correcting with on-board thrusters en route to the drone

Anti-drone ray gun

Developed by a company called Battelle, the anti-drone gun is basically a rifle-shaped beam cannon that's capable of jamming drone radio controls and killing them in mid-air. The gun fires in a 30-degree cone and has a range of 400 metres (1,300ft). The gun jams all radio – including radio detonation signals!



someone breaks into your shed and then makes off, and there are dozens of back sheds they might be hiding in... drones could be the perfect solution. They would be quicker than dogs"

So how severe does a crime have to be before the police would send out a drone, compromising public privacy and potentially posing a safety threat to the citizen's law enforcement is meant to protect? "Low-level crime would not justify a drone being deployed over back gardens of people's houses," Barry told *The Times*. That rules out vandalism, petty theft and other pedestrian crimes, then, but still – it's a very realistic possibility that we'll see drones patrolling the skies of urban areas before the years out: here's hoping the pros outweigh the cons.

In terms of how society is going to tackle drone-created crime, that's a whole different story. We're already seeing police forces in China and Japan customise and construct their own drones to mitigate the effects of public drones: one of the most interesting interpretations we've seen has been courtesy of the Tokyo Police Force. The police engineers constructed a drone with a net affixed to its underside – it flew around and caught drones violating the city's strict air traffic laws, bringing them back to police HQ.



"It largely comes down to the manufacturers to ensure safety"



As well as software features like automated take-offs and landings, 3DR is experimenting with parachutes for its Solo drone

The fact that police now need to improvise devices like this is alarming – it's a great counter to illegal invasions of airspace, sure, but it's not a particularly maintainable tactic.

It's to this end that drone manufacturers are adding more and more features to their products – making them safer generally and preventing them from areas they're (frankly) not supposed to be in. In the last year alone,

a series of drone companies have made massive headway in the safety features on the little flying machines, from attaching cages to the rotors to making sure the blades stop upon any kind of impact – the 3DRobotics Snap Drone is one of the most impressive examples: it's got a mesh cage that uses advanced tech to keep the drone in the air while keeping the blades totally sealed off from anything that could get caught there.

Since the drone market is still too small to warrant an industry based around peripherals and third-party apps, it largely comes down to the manufacturers to ensure safety features are in place and working: 3DRobotics, the maker of the Solo drone, is experimenting with interesting alternative methods regarding drone safety, such as parachute tech. If the drone senses it's losing altitude at an unsafe speed, it'll deploy the reusable parachute. This (hopefully) means that there'll be no more unfortunate accidents with drones falling out of the sky and injuring pedestrians on the ground, a surprisingly common occurrence now. The only downside of such tech is the additional weight: at 250 grams, it skims three-to-four minutes off the life of a Solo.

THE 'DRONECODE'

As of 1 January 2016, UK citizens must abide to a very strict set of rules if they want to fly drones – here's what you need to know:

- Drones must remain in pilot's line of sight
- Drones must remain under 400ft high
- Drones must keep away from aircraft, airports and fields
- Drones must not be flown within 50 metres of structures or buildings
- Drones must not be flown within 50 metres of people or vehicles

flexibility of accountable self-authorisation," states Brendan Schulman, DJI's Vice President of Policy and Legal Affairs who led the development of the system. "We believe this major upgrade to our geofencing system will do even more to help operators understand their local flight environment, and to make smart, educated decisions about when and where to fly their drones." Before these advances, geofencing was a good deal stricter. It wouldn't let users do *anything* within certain bounds, even if they were verified to do so.

This led to a lot of people hacking drone systems, which – largely – is a worse solution for everyone: hacking lets you bypass every safety feature intentionally installed into a drone, putting the pilot and those around them at risk. "Our years of actual user experience have shown that in most instances, strict geofencing is the wrong approach for this technology, and instead we are helping operators make informed, accountable decisions," Schulman added.

It's clear; as drones become a more prevalent (and inescapable) part of our society, more industries are thankfully becoming committed to at least making sure they're safe. We might see law-makers struggle to rush new rules through to make sure drone-owners don't act in a way that would harm society, but at least we're seeing the people that are creating the drones act quickly to mitigate such negative press – after all, if drones become synonymous with crime, voyeurism and constant invasions of privacy, they'll find themselves with a niche, potentially criminal market. It's a perfect case of industrial self-preservation, but one that – luckily – benefits the general public as a whole.

DJI is making some impressive advancements when it comes to the more computer- and systems-based side of drone safety, too: the company is pairing up with Geospatial Environment Online to offer anyone piloting a DJI drone on-board advice about no-fly zones, or areas where drone flight is heavily restricted. This tech – called 'geo-fencing' – basically acts like an invisible forcefield: the drone will be physically unable to fly into (or take off in) zones that are designated unsafe by an independent body.

The tech works by positioning you via GPS, and figuring out if there's anything around you that would constitute a no-go zone for drones: geo-fencing algorithms can work out whether you're near an event that's being broadcast (football, festival, local fete or otherwise), if there's a plane flying above you, if there's a sensitive area/government buildings nearby and so on.

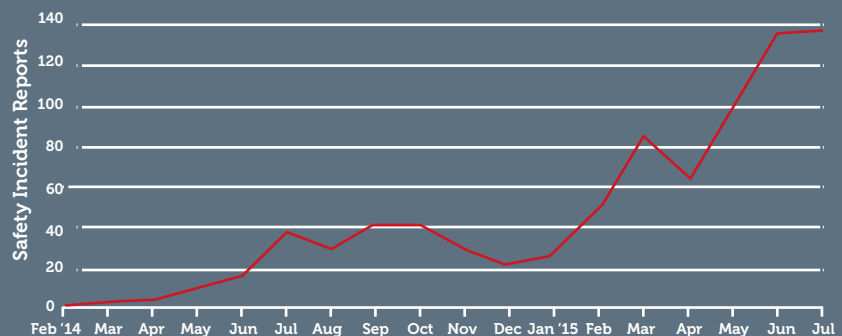
The thing is, because there *are* some users that legitimately need to fly drones in these areas (professional film-makers, military experts and many others besides), DJI gives fliers the option to input personal information – verifying credit card data or your mobile phone number, for example – to activate lift off. This way, if you're doing anything

untoward, DJI will know and won't activate your drone: it'll only fly if you've got clearance to use airspace in that area. It's not a foolproof solution, but it's certainly a start.

"DJI invented geofencing over two years ago and now continues its industry leadership by balancing enhanced safety with the

DRONE SAFETY INCIDENTS SOAR

Monthly reports to FAA of drones flying in prohibited areas or too close to other aircraft



Source: US Federal Aviation Administration

The device and app

The app shows you how to pair your phone or tablet over Bluetooth with the Spark. It then shows the digital versions of your captured drawings and syncs them with other devices via the Wacom Cloud

Blue for go

The top LED turns blue when you're writing, so you can easily check that the Spark is detecting your pen strokes. The bottom orange LED is lit whenever you're charging the Spark

A bright spark pen

Powered by the radio signals emitted by the Spark's ECR board, the battery-free pen transmits its position, along with nib-pressure information. Extra ink refills are available from Wacom

The magic button

When you have finished your note or sketch, press this button to send it via Bluetooth to your smartphone or tablet. If you haven't paired a device, don't worry! The Spark can store up to 100 notes locally

Works with normal paper

While you can use any paper, a thickness of five millimetres or less is recommended. It's also best to use an A5 pad – if using a loose sheet, some pen strokes may be offset if you accidentally move it

NOTE TO SELF: GET THIS SMART SKETCHPAD

Backup handwritten notes to digital docs at the push of a button

While digital note taking and drawing offers great flexibility for editing, there's nothing quite like jotting your ideas down with a pen and paper. That's the concept behind the Bamboo Spark, which aims to give you the best of both worlds by combining the advantages of paper and digital formats. Described by maker Wacom as a smart folio, its large neoprene case has room for a tablet or smartphone on one side and a paper pad on the other. After writing or drawing on the paper, you simply press the Spark's central button to transfer it via Bluetooth to your device, where it can be viewed in the Bamboo Spark app. The coolest feature of the

dedicated app is a timeline slider that lets you view your notes or drawings at various stages of their creation.

Unlike some rival systems that require special paper, the Bamboo Spark features a built-in electromagnetic resonance board, onto which you can place any paper. This board works with the Spark smart pen to capture 1,024 different levels of pressure sensitivity as you write. The results are certainly impressive, with every detail captured within pinpoint precision. While the Spark doesn't yet support vector drawing and optical character recognition, both features are currently being developed by Wacom.

£112 | \$160
wacom.com

Wacom Bamboo Spark

Jot down notes and ideas with your pen and paper and this smart folio will transfer them digitally onto your tablet or smartphone.

Durable carry case

The folio is made from neoprene, which should protect the contents from the elements.

USING THE SPARK APP



To use the smart folio, you will need to install the free Bamboo Spark app on your iOS or Android device. Upon launching it, you are prompted to set up a free Wacom Cloud account to enable notes to be synced easily between your devices. The app lets you view your notes, draw on them and split them using a timeline slider. For more advanced editing settings, you can use the Bamboo Paper app. Notes can also be exported as a JPG, PDF or WILL (Wacom Ink Layer Language) file.

It can feel the pressure

Secreted within the folio is an electromagnetic resonance (ECR) board that receives location and pressure information from the smart pen as it is moved around the paper

Unfortunately, it will need charging

A supplied USB to microUSB cable is used to charge the Spark from a computer or phone charger. A full charge will power eight hours of continuous use or several weeks on standby

3 BRIGHT SPARKS

The Bamboo Spark comes in three versions to suit different devices. The Spark with a gadget pocket is designed to carry your phone or a small tablet. The Spark with a tablet sleeve can hold a tablet up to 9.7 inches in size. Finally, the Spark Snap-Fit features a clip-in case specifically measured for the iPad Air 2.



086

TAKE THE MATHS
OUT OF BAKING**Cooking timer**

When you need to bake something in the oven, tap Start in the relevant step and this timer will count down to an alarm

£80 | \$100
getdrop.com

Drop Scale

A smart kitchen scale that weighs your ingredients separately as you add them to the bowl and then guides you through your recipes using a free app on a connected iPad or iPhone.

TAKE THE MATHS OUT OF BAKING

This smart kitchen scale will work out when you've added enough ingredients, so you don't have to

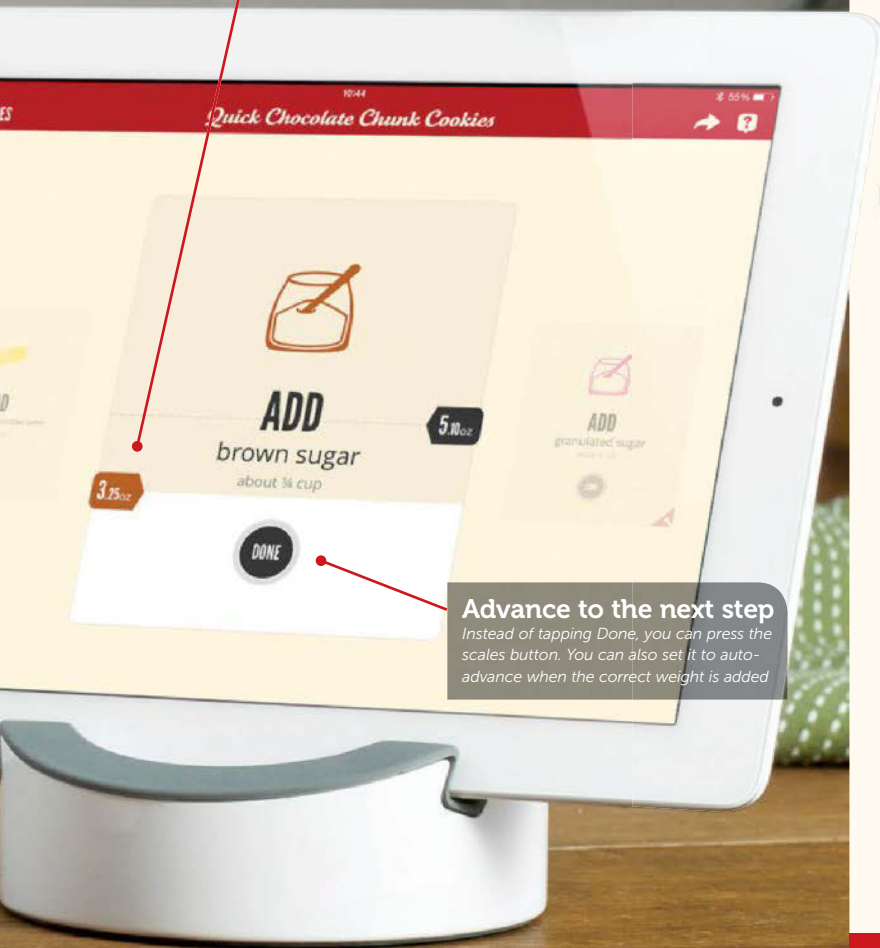
After watching *The Great British Bake Off* or *Simply Nigella*, you may feel inspired to get into the kitchen. But what looks easy on TV often proves trickier and much messier in reality. If only we had our own personal assistant for the kitchen to guide us...

The Drop Scale is here to fill that role. This smart scale connects via Bluetooth to an iPad or iPhone that's running the Drop Recipes app. The latter guides you through recipe steps, weighing each particular ingredient as you add it to your own bowl placed on the scale. Since you don't need multiple bowls for many recipes, nor lots of measuring cups, it should also save you on the washing up.

You don't even need to touch the iPad screen with floury fingers, as you can advance to the next step of the recipe by tapping a button on the scale. Possibly the most useful

Weighing it up

The left marker shows the weight of each new ingredient as you add it to the bowl. Aim to match the target weight on the right



Advance to the next step

Instead of tapping Done, you can press the scales button. You can also set it to auto-advance when the correct weight is added

A great non-slip surface

The top of the Drop Scale is made from a non-slip, anti-static, kitchen-safe silicone that is also heat resistant

No flour on your iPad's screen

You can advance through the Bluetooth-connected app's recipe steps by pressing this capacitive touch button, which features an LED indicator

Sturdy plastic base

Made from the same plastic that's used for LEGO bricks, the three-part base gives rigidity to the otherwise flexible silicon top of the scale

Single-point load cell

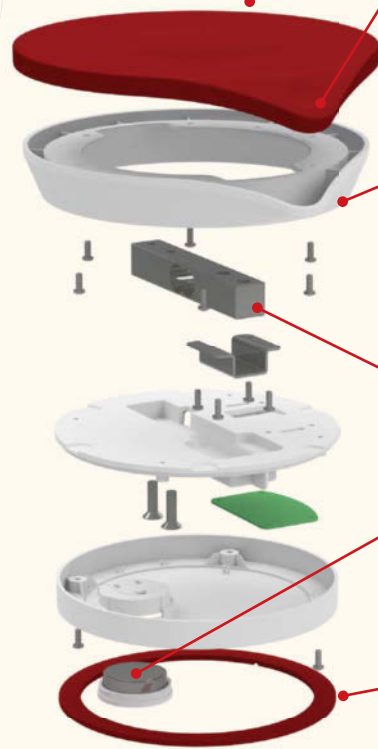
This aluminium bar has strain gauges that can measure tiny movements in the metal as it stretches when weight is applied

Battery power

The Drop Scale is powered by a standard coin cell battery, which should last over a year with normal use

Stuck fast

To ensure that the Drop Scale doesn't slide around on your kitchen counter or table, its base ring is made from non-slip silicon



GET APP ADVICE

While the Drop Scale app functions as a simple scale readout, the main attraction is the Drop Recipes app. Each of its 250+ recipes has easy-to-follow steps that show the weight of each ingredient as you add it. You can even set it to auto-advance once you have added the correct amount or just press the button on the scale. If you don't have enough of an ingredient, recipes can be scaled to account for what you do have. Some ingredients may also be substituted.

feature is the ability to scale recipes up or down according to how much of a certain ingredient you have in your cupboard.

While you're limited to the recipes in the app, the device can also be used as a standard scale. In addition, a Drop Creator programme is in the works, which will enable users to add and share their own recipes.

"What looks easy on TV often proves much messier in reality"

BECOME AN EXPERT BARTENDER TOO!

The Drop Recipes app includes a selection of classic cocktails to mix. Just place a cocktail shaker or jug onto the scale and start adding the ingredients in turn, following the steps in the app that show the weight for each element as you pour in. Finally, add optional ice, stir, strain into a cocktail glass and add a garnish. As with food, you can scale recipes up or down according to how much of an ingredient you have available in your drinks cabinet.



088 | DO YOU DARE TO
STREAM EVERY
SINGLE MOMENT?

DO YOU DARE TO STREAM **EVERY** **SINGLE MOMENT** OF YOUR LIFE?

Broadcast your world with a wearable camera

A revolution is coming: we are now on the front lines of a war for privacy. Everything from intimate moments to monstrous fails and our general day-to-day habits could easily end up in someone else's shots or videos. How many selfie stick photos have you unwittingly been part of in 2015 alone?

The SnapCam LE is the next step: a tiny palm-sized camera that can easily clip onto any item of clothing and (Wi-Fi permitting) broadcast everything you see to a hashtag-friendly world. iON has packed in a tonne of tech into this small splash-proof device, including an 8MP camera capable of recording 2.5 hours of HD video at 1080p quality or for one hour of live broadcasting. It puts your life, and those of others, on display and looks to fill the gap left by the demise of Google Glass as a luxury consumer item.

On paper, it's a handy device that's great for capturing the better moments in life – far from the staged poses and dead eyes of your traditional selfie situation – but that doesn't mean it's perfect. There are problems connecting to the companion app that acts as a viewfinder, there's a lack of a steadicam (which means your videos can often be blurry) and there's no integrated 3 or 4G support, meaning you're limited by location for live-streaming your life.

£200 | \$200

uk.ioncamera.com

iON SnapCam LE Camera

A wearable camera that looks to seamlessly integrate with your life to record your daily comings and goings so you can broadcast it to the world via the internet.

How we
opened
up our
lives for
the whole
world to
see us

1999

Blogger Launches

One of the earliest blogging tools, Blogger indoctrinated a new generation to become comfortable posting their lives online, paving the way for social media.



2002

Sanyo SCP-5300

The first commercially available camera phone available in the Western market, the SCP-5300 featured a pretty kick-ass (see also: lame) 0.3MP camera – whoa.



2003

Photobucket launches

A real pioneer of social image sharing, Photobucket would later be acquired by Twitter in 2011 to become the de-facto photo sharing website.



2004

Facebook launches

Where would we be without Facebook? By 2010 it had changed the way we share content, with more than 100 million photo uploads a day recorded.



Multi-shooting options

Unlike other variations of the SnapCam and wearables, the LE version can shoot video in two resolutions: in 1080p at 30fps or 720p at 60fps

Great picture quality

The SnapCam LE comes equipped with a front-facing 8MP camera to shoot both pictures and record video in surprisingly high quality

Buy a memory card

Want to record video and save it for later? You'll need to buy a 2GB or 32GB microSD card to save up to two hours of recording

Broadcast from wherever you are

Live stream your life for an hour at a time, just make sure you are connected to Wi-Fi if you want stable streaming

Multipurpose attachments

SnapCam not only comes equipped with a magnetic clip – for easy attachment to items of clothing – but it can also be attached to Selfie Sticks and other tripods

No viewfinder

The lack of a viewfinder on the SnapCam LE means you'll want to (attempt, at least) to pair it with your Apple or Android smartphone to see just what you're shooting

WHAT'S IT LIKE TO WEAR A SNAPCAM?



Josh West, 26
Bournemouth

Wearing the SnapCam LE in public is a strange experience, but so was having the giant iPhone 6+ warping our pockets once upon a time. You'll get some odd looks, you'll find yourself playing up to the camera or avoiding things you might struggle to complete easily, and yes, you might even get thrown out of the pub. It might have been worth it if the streaming connection was more reliable and the quality (while physically on the move) was steadier and better. Still, it will certainly be a laugh in certain situations – summer beach BBQs, we're looking at you.



The SnapCam is available in a few colours - though the white model with a blue rim may not be so subtle to wear

2004

GoPro 35mm Hero

Designed to record sporting related adventures, the GoPro had humble beginnings back in 2004 before transforming into the video-recording behemoth it is today.



2006

Twitter launches

It might have launched quietly, but Twitter made it easier than ever to quickly share photos of your commute with uninterested followers.



2007

iPhone launches

Basically, this is where it really kicks off. iPhone debuts and suddenly we are beginning to understand that we can truly snap and share anything we want.



2010

Instagram

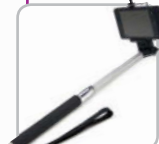
Instant image editing comes to amateur photographers around the world thanks to this handy app; your breakfast had never looked so artistically framed before this, #nofilter.



2014

The selfie stick

This proves that we, as a society, have become both obsessed with sharing everything and wildly infatuated with our own faces.



090

THE SECRET TO COOKING
THE PERFECT CHIP

THE SECRET TO COOKING THE PERFECT CHIP

Hottest fryers put to the test

£100 | \$145
russellhobbs.com

Russell Hobbs Purifry

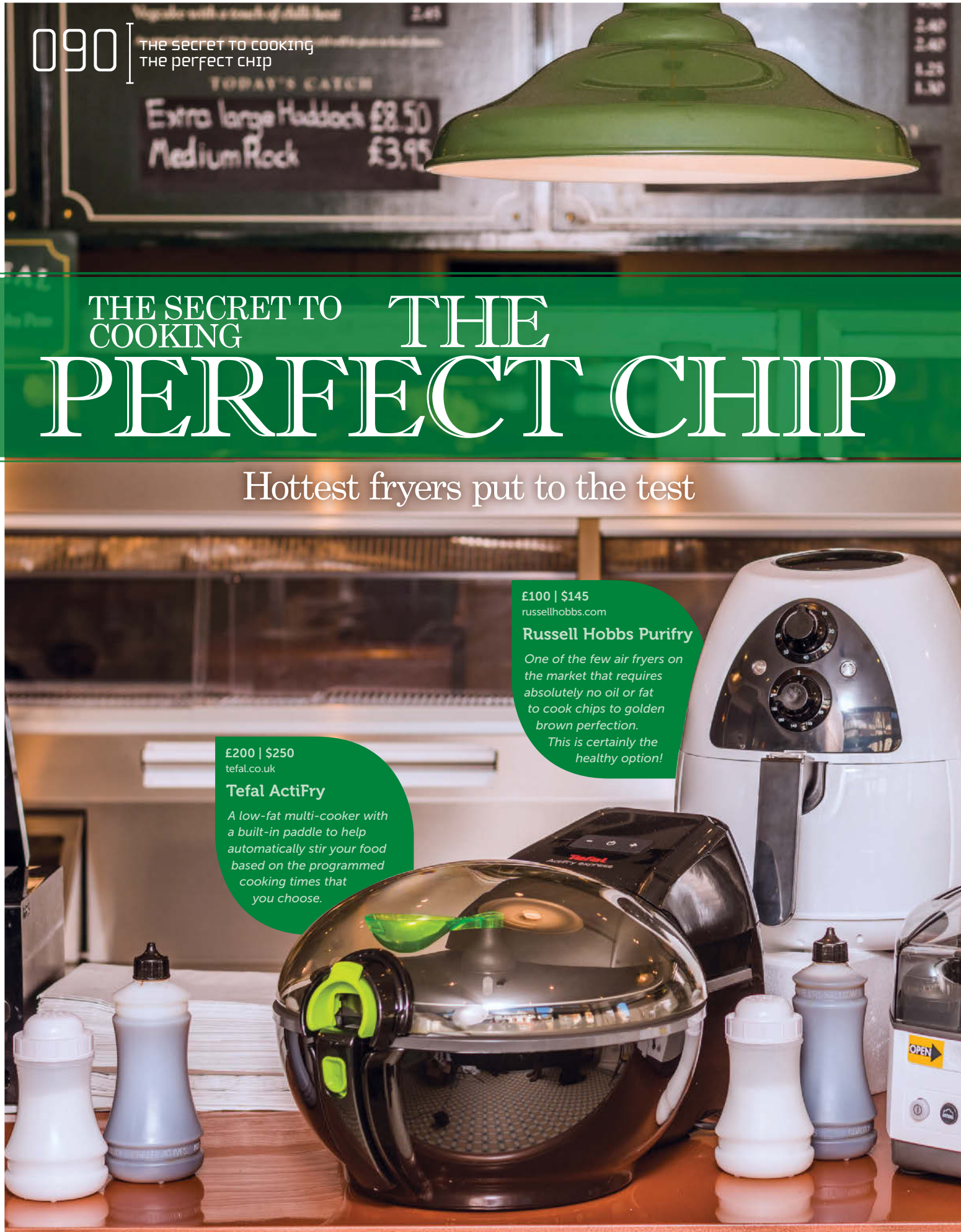
One of the few air fryers on the market that requires absolutely no oil or fat to cook chips to golden brown perfection.

This is certainly the healthy option!

£200 | \$250
tefal.co.uk

Tefal ActiFry

A low-fat multi-cooker with a built-in paddle to help automatically stir your food based on the programmed cooking times that you choose.



The quest for fantastic French fries is far more difficult than you might realise. You might think it's as simple as chopping up some potatoes, boiling them, then throwing them in oil – or failing that, going to McDonalds – but you'd be wrong. To reach chip nirvana, you need to find the crucial balance between a crisp outer edge and fluffy interior.

However, this doesn't mean that preparing the perfect chip has to be left to the professionals at your local chip shop. The necessary equipment is readily available and doesn't cost nearly as much as you might think. Rather than installing an industrial vat of bubbling oil in your kitchen, you can pick up an air fryer for as little as £100/\$145.

Not only will this save your money and your waist-line, cooking chips with hot air is a great way to achieve that golden-brown coating and fluffy interior we all crave. So forget everything you thought you knew about the art of cooking chips, as we're about to show you how to create the best chips you have ever eaten. Don't worry, you can thank us later.

£130 | \$200

sageappliances.co.uk

Sage Smart Fryer

Master chef Heston Blumenthal's fryer of choice uses electronic thermostats to make crispier chips.

£180 | \$200

philips.co.uk

Philips AirFryer

The AirFryer is an all-in-one fryer that uses hot air to cook any and all food items placed inside at the optimum temperature.

£190 | \$200

delonghi.com

Delonghi MultiFry

While it uses the same heating technology as the other fryers showcased here, the MultiFry is equipped with a lower wattage heater in order to help save a few pennies on your bills.

092 | THE SECRET TO COOKING THE PERFECT CHIP

The magic formula

Philips has incorporated Rapid Air technology into the AirFryer, which circulates air within the chamber to crisp the outside of your food and keep it soft on the inside

TASTE

Once you've nailed the cooking settings, the air frying does wonders to the taste of the chip. Fluffy on the inside and crunchy on the outside, a winning combination!

Cook in seconds

The AirFryer can remarkably preheat from room temperature to 200 degrees Celsius in just three minutes. Add your potatoes and you'll have cooked chips in 12 minutes!

Tickle your taste buds

Fancy trying something different? The AirFryer can be used for everything from cooking chicken to even baking a cake, just follow the specified timings on the AirFryer

MAKE THE HEALTHIEST CHIPS IN THE WORLD

Frying your chips with air may seem like something that's best left to Heston Blumenthal, but it's actually by far the healthiest way to cook. The best fryer to do this is the Philips AirFryer, which uses rapid heat technology that's capable of cooking the outside to a perfect crisp, while guaranteeing a fluffy and soft interior. The unit uses a central grill and fan to blow hot air around the circumference of the cooking chamber, which can get to just over 200 degrees Celsius and achieve what scientists call the Maillard effect – the browning and crisping process of cooking food.

One of the other key elements of the AirFryer is its incredible speed of cooking. Where those resigned to oven chips will be waiting close to 30 minutes for the finished product, with just a single tablespoon of oil mixed into your chopped potatoes, the AirFryer cooks a crisp chip in just 12 minutes. Thicker chips will undoubtedly take a little longer, but you'll be guaranteed a perfectly healthy chip every time you use the Philips AirFryer.

Manage your load

The cooking basket in the AirFryer can hold just over a kilogram of uncooked potatoes. Pull firmly on the handle to remove the basket from the fryer compartment



COOK CRUNCHY CHIPS FROM FROZEN

Let it work for you

The automatic paddle will constantly mix chips or any other food on set timings – this will stop you needing to manually stir your own food

Add some heat

The combination of a 1,400-watt heating element and central fan helps distribute heat around the food and cook it at a quicker rate than conventional cooking

Experiment with food

A second heating element solely at the bottom of the MultiFry is ideal for cooking fish or the base of a small pizza when you fancy something other than chips

Feed the family

The MultiFry is capable of cooking up to 1.7kg of fresh potatoes at one go. That's enough to serve eight people and still have some spare!

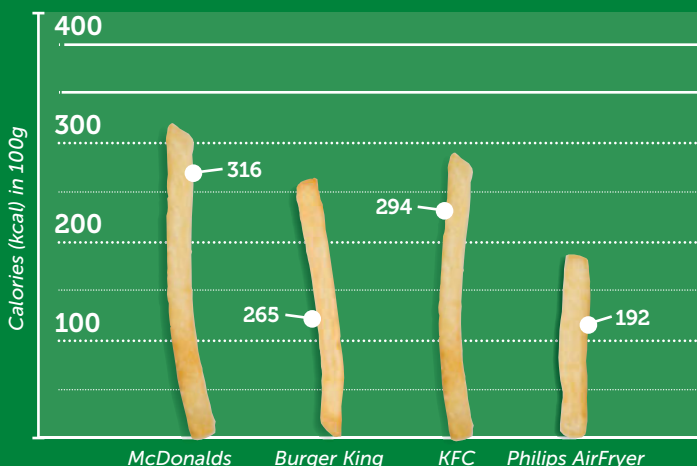


TASTE

The rapid cooking of the DeLonghi MultiFry does tend to leave chips with a bit of an extra crunchy crisp, which some may perceive as being a bit too overdone.

WHY SHOULDN'T YOU EAT FAST-FOOD FRENCH FRIES?

Despite a similar carbohydrate level, the harshness of deep-fat frying leaves saturated fat and calorie levels high among most takeaway outlets compared to an air-fried chip



The DeLonghi MultiFry goes far beyond just cooking you the perfect chip time and time again, as it also caters for a range of frozen food, enabling you to cook any meal you like without having to wait for pesky defrosting times to take effect. The programmable timer and temperature gauge enable budding cooks to cook from frozen in a matter of minutes, ideal if you're after a bite to eat yet can't be bothered to wait for it to defrost.

Built into the MultiFry is DeLonghi's own Surround Heating System, which, true to its name, surrounds your food, giving it an even cook throughout, but adding that extra crisp when you want it. Plus, there's no need to check your food at intermittent times as the timer activates the mixing paddle to give your fries, chicken or any other food a quick shake for you while cooking. If you want a cooking experience, but are perhaps too much of a novice in the kitchen or a little lazy, the DeLonghi MultiFry is certainly worth checking out.



THE SMART WAY TO DEEP FAT FRY

No excess burns

The Sage Fryer will self regulate when it deems the oil to be too hot. Not only is this good for the lifespan of the oil, it will stop your food burning

Heston Blumenthal is widely regarded as the mad scientist of cooking, coming up with weird concoctions that the average cook wouldn't dare try to replicate. His line of cooking equipment isn't quite as bold as his ideas, but it doesn't mean the products aren't just as good.

The Sage Smart Fryer looks like your average deep-fat fryer, but looks can be deceiving. It's one of the first deep-fat fryers on the market to include technology that adjusts the time, temperatures and the levels of the oil when needed. While the use of oil is a little on the unhealthy side, the Smart Fryer uses CoolZone technology to help prolong the life of the oil used in the fryer, as well as prevent excess burning of your food. Actually, we would put our necks on the line and say it's by far one of the healthiest deep-fat fryers out there – as strange as that sounds!

Oh, and for all you chip aficionados out there, Heston has included a helpful twice-fried chip function to help cook golden pillows of goodness with ease.

What to cook?

Use the dial to switch between different presets; including the twice-fried chip option located at the top before confirming with the start button

Turn up the heat

When you first place any cold produce into the fat, the fryer will automatically raise the temperature of it to help get the produce above room temperature in seconds

Cook from frozen

If you want a quicker way to cook frozen chips, select the frozen option and dunk your chips in. The end product is similar to that of your normal twice-fried chip

TASTE

The triple-cooked exterior of the chip is truly unrivalled to any other chip out there and the benefit of this recipe is that it adds a very nice crunch to your chips

JUPITER COOKS OUT-OF-THIS-WORLD CHIPS

Want to make the best French fries in the universe?

Well, it may be more difficult than you initially thought. While experimenting with what astronauts can eat in space, Greek scientist Thodoris Karapantsios tried cooking chips in a giant centrifuge to replicate what gravity is like on different planets. He found that the strong gravitational force of Jupiter, which is three times stronger than that of Earth, accelerates the transfer of heat from

the oil to the potato and consequently aids the escape of any excess water. This means that Jupiter chips wouldn't just cook faster, the end result would also be thicker with a crispier crust.

However, while the Red Giant might be the place to go for steak chips, you should definitely order something else on your next Moon mission. Professor Karapantsios found that French fries cooked in lower gravity, like that on the Moon and Mars, would be unpleasantly soggy as there wouldn't be enough force to cause the air bubbles to detach from the chip.

TRY YOUR HAND AT TRIPLE-COOKED CHIPS

Cook Heston's signature dish with his Sage Smart Fryer



01 Remove excess starch Place your cut chips into a bowl of cold water and leave five minutes to remove excess starch. Once done, drop them into a pan of hot unsalted water and leave until soft.



02 Keep them cool Remove chips individually and place onto a cooling rack, being careful to drain any water from them. Once all the chips are cool, place in the fridge for around thirty minutes.



03 Preheat the Sage fryer Preheat to 130 degrees and drop the basket inside, filled with your chips. Cook until the chips have a dried exterior, before removing and placing in the fridge for a second time.



04 Cook for a third time Now increase the temperature of the Sage fryer to 190 degrees and place your chilled chips back into the fryer. Cook until golden brown and crisp on the exterior.



05 Thoroughly drain The crisp exterior may hold a slight amount of excess oil, so raise the basket out of the fryer and give three stiff shakes of it to remove any excess oil that you don't want.



06 Season and serve Pour the chips into a large bowl before seasoning thoroughly with salt and pepper. You are now ready to enjoy your amazing triple-cooked chips from scratch.

WHY ARE YOU STILL USING A HAND PEELER?



Pifco Potato Peeler

A fully electric potato peeler that's capable of peeling 1kg of potatoes in less than two minutes. Plus, stainless steel blades make it easy to clean. **£37 | \$54 | pifco-products.co.uk**



VonShef Potato Chipper

Get the exact same size of chip every time you chop by putting them through this special metal potato chipper from VonShef. **£12 | \$18 | vonshef.com**



Oxo Chef's Mandoline Slicer

Fancy a crisp instead of a chip? The Mandoline Slicer from Oxo creates razor-thin potato slices without the danger of chopping your finger off. **£60 | \$70 | oxouk.com**

096

power up your mornings
WITH THE EMICRO ONE

£750 | \$1,000

micro-scooters.co.uk

Emicro One Scooter

Get to places twice as fast and with half the effort of before with the hybrid Emicro One Scooter. It's lightweight, foldable and motorised – the perfect commuter companion.

Dual-core wheel

The front wheel is hard on the outside and soft on the inside, meaning it absorbs shock better than a rubber wheel and will take a while to succumb to regular wear

No more uphill struggles

The Emicro One's slope support system in its motion-control algorithm automatically increases the power and torque when riding uphill. When sensors detect a slope, the scooter ascends with ease

Scoot in a hurry

The foldable design makes assembly and disassembly simple, this means you can store the scooter in your car, on the train or under your desk with virtually no hassle

POWER UP YOUR MORNINGS WITH THE **EMICRO ONE**

The smart scooter that could be your ride to work

During rush hour, the commute to work can sometimes be too much to face. The train is overcrowded and the bus is never on time. If you've tried and failed to find a more bearable method of transport in the early morning, the Emicro One electric scooter could well be the answer.

Obviously, a scooter is no good for long distance trips, but it will shave minutes off

your commute time and get you out in the fresh air, away from the stink, sweat and general awfulness of the tube.

For such a small scooter – it weighs only 7.5kg – it packs quite a punch. Besides the initial kickstart it needs to power up the motor, it requires almost no effort from the rider, brakes quickly and easily, and it can even be used uphill. Three ride programmes,

eco, standard and sport mode, mean that the scooter can adapt to whatever urban landscape you need to brave to get to the office in time for the first coffee of the day.

It's designed specifically to suit the needs of the professional commuter, but do make sure you to first check your area's Department of Transport rules before you start ploughing down pedestrians.

HOW GOOD IS IT?



**Poppy, 23
Hemsworth**

I rode the Emicro One to work and this is what happened...

My commute takes 20 minutes when walking and includes pavements, pelican crossings and an underpass. I didn't fancy being yelled at by angry pedestrians as I whizzed by them down a narrow footpath, so I opted for a different route. This one takes 25 minutes, but it mostly consists of one long pavement down the side of a main road. With the scooter, I managed to shave the trip down to 15 minutes.

This route also ends with an underpass, but it's 50 per cent uphill and I thought the little scooter wasn't going to manage it. I gave it a little kick off (and a few words of encouragement), but it didn't need it. With both feet on the foot board, it ascended the hill no problem. I could feel it slow down a little, but it upped the torque and power, so soon we were flying. The other 50 per cent of the underpass is a downhill slope, but it managed that too. Just let the scooter glide downwards while periodically putting pressure on the brake.

The scooter, sadly, is terrible on bumpy paths. It's also not great in rain. The instructions warn not to use it on a wet surface, but I didn't listen. Especially as the heavens decided to open unannounced. I also didn't slip over, but it was a close call.

Braking has never been so easy

A smart regenerative braking system, controlled by pressure on the back wheel, both charges the scooter's battery and reduces the braking distance – great for use on busy streets

Customisable tap speed settings

The Emicro One comes with three pre-programmed speed settings. The setting tool communicates with the on-board computer through magnet induction technology, so you can swap speeds as you scoot

The power of the hub

The small yet powerful brushless DC motor in the back-wheel hub can produce power of up to 500 watts and register torque of four Newton metres – pretty impressive

Eco, standard or sport mode?

Get the most out of the Emicro One by choosing a mode that suits you. Different ride programmes limit the speed and power of the motor to suit your terrain

Charge quickly and easily

The scooter's battery takes only an hour to fully charge and can withstand more than 1,000 charging cycles before it needs to be replaced



098

MAKE YOUR BIKE RIDE
SAFER WITH RADAR**Line of sight**

This LED display flashes if a car is behind you. However, looking down at your handlebars to determine the distance of an approaching vehicle isn't recommended at the best of times

Red alert

As well as alert the cyclist that a car is getting too close, the radar sensor has a built-in rear light, which will flash at the offending tailgater. A good idea, but at 15 lumens its not the brightest signal

PROTECT YOURSELF FROM THE TRAFFIC YOU CAN'T SEE WITH **RADAR**

Get alerts when a car is too close

If you're a bike commuter or even just a casual cyclist, it's safe to assume you're going to encounter road traffic – it's unavoidable in urban environments. Checking for upcoming cars by looking over your shoulder is the standard way of maintaining situational awareness, but let's be honest: that's not the safest way of doing things.

The Garmin Varia Rearview Radar aims to make travelling on roads a slightly safer endeavour for cyclists and motorists alike: the radar will pick up any car coming up on the tail of the radar, then alert both driver and rider that there's something else on the road. The thing is, without an audible alert and without the capability to track other cyclists or cars that are travelling at the same speed as you, this isn't the kind of pinging radar you would expect. It's still a worthwhile investment for any safety-conscious cyclist, but in noisy environments or busy cycling lanes, you might just be better off relying on your situational awareness.

Not pre-paired

Pairing the radar-enabled light with the head unit that sits on your handlebars takes a few minutes, but is incredibly easy to do. Just hold the button down on both gadgets and you're set to go



£140 | \$200
garmin.com

Garmin Varia Rearview Radar

The first ever bike radar comes with a tail light and a head unit to attach to your handle bars for ease of use. The light scales brighter when cars get closer.

Mount it up

The light connects to your seat post with an elastomer band – a now-standard fitting for Garmin. It's easy to fit or remove and has no problem staying attached on even the bumpiest of rides



garmin varia rearview radar | 099

150



GOING THE DISTANCE

The Garmin Varia Radar can detect upcoming cars up to distances of 150 yards (about 137 metres). The display that sits on your handlebars has 15 steps leading to the light that identifies where you are, meaning each dot represents a car in increments of 10 yards. It also only shows cars that are gaining on you – anything slowing down or moving at the same speed as you isn't detected by the tracker. On busy roads, this can get difficult to read, but after a slight learning curve, you will begin to understand the display better.

UPGRADE YOUR RADAR

There's a whole range of other Garmin products you can pair the light with if you feel so inclined – you can also simply buy the radar light on its own.



Varia Vision

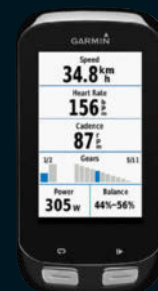
Versatile mounting enables this device to fit to most brands of cyclists' glasses and can display data directly into your eye line: from turn-by-turn directions (fed to the device from a GPS-enabled phone) to performance data collected from the ride you're currently out on.

£320 | \$460 | buy.garmin.com

The Garmin Edge Explore 1000

A three-inch capacitive display that adjusts automatically depending on what kind of light you're riding in, it offers 15 hours battery life and acts as a mini GPS/road map that fits onto your handlebars when you're riding. It can also receive calls and has positional tracking via Bluetooth from your phone.

£350 | \$500 | buy.garmin.com



Varia Smart Bike Lights

As your speed increases, these intelligent lights begin to project their illuminating arc further when paired with an Edge computer. When light conditions change, the lights will brighten or dim too. They can also be paired with a remote that can wirelessly turn them on or off.

£160 | \$230 | buy.garmin.com

100 | FEED YOUR PETS AT HOME... FROM WORK!

PLAY WITH YOUR DOG AT HOME... FROM WORK!

Watch, talk and feed your pet treats with this remote control spy camera

Leaving the house for an eight-hour fun hiatus can kick you in the heart pretty strongly, especially when your best friend's wet nose is steaming up the window as you head off to your grey commute. Yup, leaving a pet at home can suck, and you need to have a plan in place for them for while you are out.

All pets are different, but one thing is set in stone in their needs: food. Petzi takes the edge off this concern and gives you a nifty way to be able to check in

on your pet, talk to them and even send them a care package in the shape of their favourite snack. In short, the Petzi Treat Cam is an all-seeing, all-speaking food dispenser. Using a mains power and a Wi-Fi connection, you will be able to see just what your fluffball is up to when you're away and, thanks to an incredibly straight forward and uncomplicated app, you can stream a (slightly-delayed) live feed of what the Petzi sees and make it reward your fluffy friend with a treat.

£111 | \$170
petzi.com

Petzi Treat Cam

A food dispenser controlled by you from afar on your smartphone to feed your pet when you are out, giving you a visual as to what they are up to and enabling you to talk to them as well.

Removable and cleanable casing

The casing comes off easily for cleaning, but most importantly, it comes off so you can top up the treat box!

Food hole!

The Petzi has a dispenser point that will throw out one to three one-inch treats of your pet's liking. Obviously, it's up to you to fill the device, but the Petzi will throw them out for you!

Speak on command

The Petzi has a speaker built in that will play your voice back to your pet, obviously it's not a pure replication of your voice, but in most situations it's enough to beckon your pet closer

What size food treats can it dispense?

— 1 inch —



Wide-angle lens

The Petzi has a good field of vision to track your pet with, enabling you to see most of the room around it on your phone. Also has night vision to work in the dark

WHAT DID BUDDY THINK OF PETZI?



On initial investigation, our test subject Buddy was massively apprehensive of Petzi. Having said that, once the familiar smell of his own home, the dispensed treats and the act of regularly passing by had gotten him used to Petzi, he was quite okay with the device being in his general living space. Buddy was happy to eat the food that Petzi dispensed, but he would certainly not hang around for it to throw food out. Although not best friends yet, I am confident they will be eventually as he is a happy dog around humans, but all-seeing eye bots do tend to keep him on edge.

Distance treats fly out of the Petzi

1 metre

CONNECT WITH YOUR PET ANYWHERE

Yeah, that's right... If Schrödinger had had a Petzi, then he'd have known what was up with his cat! Use the Petzi app as your dashboard for the camera and you'll see live footage – tap to feed and talk to your pet.



Get sociable

The Petzi app also works as a freestanding social media app when used without the camera, kind of like a pets-only Instagram, which lets you post images of your pets and receive awws and hearts back



Options and settings

The Petzi app will enable you to select a night-vision mode for more opportunities to track your pets at all times of day and night

Treats!

Simply tap the bone icon and, hey presto! Treats appear! Although they do get flung out, so if you have an easily worried pet, make sure the landing is soft

Microphone checker

To communicate with home base, simply press and hold the mic icon down – this will activate the mic in your phone and relay the message to your Petzi

102

zap your TOOTHBRUSH
CLEAN WITH UV RAYS£25 | \$36
firebox.com**Violife Zapi Luxe UV
Toothbrush Sanitiser**

Its UV lamp kills 99.9 per cent of bacteria on your toothbrush during a seven-minute cleaning cycle. The Zapi Luxe also comes in a range of styles.

There is only one way to kill the bacteria lurking in those bristles...

ZAP YOUR TOOTHBRUSH CLEAN WITH UV RAYS

Resembling an oversized Weeble, the Violife Zapi Luxe wobbles, but it won't fall down. It does, however, have a more serious purpose: keeping your toothbrush germ free. Just think about it: here's an item that we insert into our mouths on a twice-daily basis and yet we rarely think about how clean it is, other than maybe giving it a quick rinse under the tap after brushing, which doesn't kill any bacteria.

While alternative sanitisation methods include soaking a toothbrush in mouthwash or even putting it in the dishwasher (don't do this), they're not as convenient as the Zapi Luxe. Just clip your manual toothbrush or an electric brush-head into the top, tap the button and the blue LED starts flashing to show it's working. You can even leave the brush in the Zapi if you like. The cleaning cycle lasts about

seven minutes and the Zapi's UV bulb kills 99.9 per cent of germs and bacteria, including some pretty nasty ones, like H1N1 (aka swine flu), E. coli, Staphylococcus, Salmonella and Listeria. While not replaceable, the UV bulb lasts up to 8,000 hours – in effect, a lifetime. Nevertheless, you will need to change the three double-A batteries that power the Zapi and clean out the interior drip tray.

HOW DIRTY IS A TOOTHBRUSH?

10 million

Number of bacteria cells living on your toothbrush at any one time

3 99.9%

Percentage of germs and bacteria killed by the Zapi Luxe

Number of months you should use a toothbrush before replacing

1.8

Distance in metres bacteria may be dispersed by flushing the toilet

75%

Number of people who don't replace their brush every 3 months

3,000

Times more bacteria found on hollow electric brush-heads

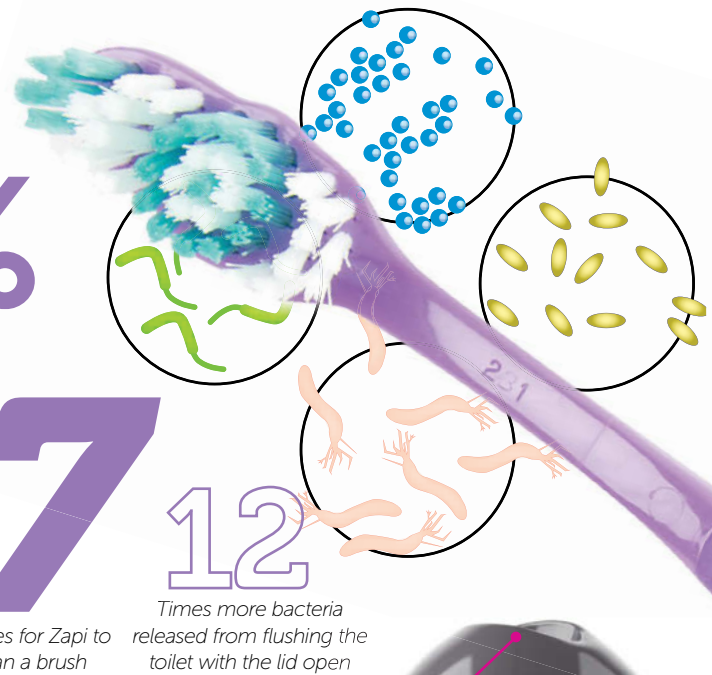
7

Minutes for Zapi to clean a brush

12

Times more bacteria released from flushing the toilet with the lid open

Source: Violife, NHS, British Dental Health Foundation, University of Manchester, University of Texas Health Science Center

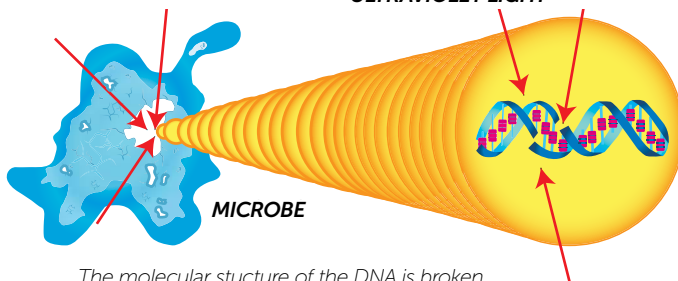


HOW UV KILLS GERMS

One of three categories of ultraviolet light, the type the Zapi Luxe uses, UVC, has a shorter wavelength range than the better-known UVA and UVB, and is the only type that is harmful to bacteria. Most potent in this respect at wavelengths between 250nm and 260nm, it causes damage to the DNA of bacteria cells by breaking its molecular bonds. With the affected cell unable to carry out its normal functions, its repair mechanism kicks in – if the damage is too extensive, this will cause the bacteria cell to die.



ULTRAVIOLET LIGHT



MICROBE

The molecular structure of the DNA is broken down, rendering the microbe harmless

Hole for toothbrush

Place the head of your toothbrush through the hole at the top of the Zapi Luxe sanitiser and clip its neck into the rubber holder

Germicidal UV bulb

The UV lamp kills off most of the germs and bacteria during the seven-minute cleaning cycle. It should last a lifetime!

Button and blue LED indicator

Tap the button to start the cleaning cycle. Its blue LED will glow during operation or flash to indicate low battery

Removable cap

The top cap of the Zapi can easily be removed – by squeezing and pulling – to access the slide-out drip tray for a weekly clean

Battery power

The Zapi Luxe is powered by three standard double-A batteries. The compartment is easily accessed by unscrewing the base

A weighted base

The heavy weight in the Zapi Luxe's curved base means that it will always stand upright, even if placed on an uneven surface



WORKSHOP

PROJECT
01

HOW TO ESCAPE A BURNING BUILDING

*Keep a cool head during
a house fire*

No one likes to imagine that there will be a potentially fatal fire in their house, but the fact remains that sadly they're an all-too common occurrence and although you may think that your house is safe and secure, accidents do happen.

One thing that could save your life in the event of a house fire is a set of working smoke alarms. Have one in every room of the house and check them regularly to make sure that they really are working.

If there's a fire in the middle of the night then they will almost certainly wake you up before you could possibly know there's a fire in the house.

With the proper kit at your disposal, a decent fire plan in place and a smattering of common sense though, we believe that fire fatalities can be avoided. And although statistics show that house fires and also fatalities are fortunately dropping each year, it pays to be prepared for the worst.

THE KIT THAT COULD SAVE YOUR LIFE



First Alert Fire Blanket

We can't recommend getting one of these fire blankets enough, as it's the perfect thing to have close at hand in an emergency – especially in the kitchen.
£17 | \$25 | firstalert.eu

Nest Protect

From the people who brought you the brilliant Nest Thermostat, the Protect senses when there's a hint of smoke in the house and gives you a spoken warning – it can even send a message to your smartphone to alert you.
£89 | \$100 | nest.com



SentrySafe Fire Chest

If you do have a fire, it's good to know that your most precious documents remain safe. This Fire Chest is the perfect thing for storing any of your valuable documents and jewellery, and it is also guaranteed to have at least 30 minutes of complete fire protection.
£24 | \$27 | sentrysafe.co.uk



Firemart 2kg Dry Powder Fire Extinguisher

This small yet perfectly formed fire extinguisher is the ideal size for home use and, as it's dry, it can be used for electrical fires too.
£17 | \$25 | firemart.co.uk



Kidde 3-Storey Escape Ladder

Hopefully this is one thing you'll never have to use, but if the fire spreads upstairs, then this escape ladder could make the difference between life and death. It packs down small so can be stored away, but it's also easy to deploy if you need to make a quick escape.
£65 | \$53 | kiddesafetyeurope.co.uk

HOW COMMON ARE HOUSE FIRES?

28,200

Home fires in England between April 2014 and March 2015

26%

Drop in the number of house fires in the last ten years

215,600

False fire alarms in the UK were attended by the Fire and Rescue Service during 2014 and 2015

44%

Percentage of false alarms attended by local fire services

163

Total fatalities in England in home fires during 2014 and 2015

30%

Drop in the number of fire fatalities in the last ten years

2

Number of home fires started every day by candles

6,000

Number of home fires are caused by faulty electrics in the UK every year

35

Number of people who die in home fires because of a faulty smoke alarm in UK each year

60

Average deaths per year in UK home fires started by a cigarette

Source: UK Department for Communities and Local Government statistics

HOW TO SURVIVE IF THE WORST SHOULD HAPPEN



01 Make a plan

The best way to survive a house fire is to be prepared and have a fire plan. Basically, this means in the event of a fire everyone knows what they should be doing and there's a planned escape. One person in the household needs to be in charge: they need to make sure everyone is out and call the emergency services.



02 Try to close the doors on your way out

If it is possible to safely do so, close the door to the room where the fire originated and then close all the other doors behind you on your way out of the building. This should help to delay not only the spread of the fire, but also the smoke too, which can be just as dangerous.



03 Check for heat before opening the door

Never ever open any doors in the house until you're sure it's safe, as there could be a fire on the other side of it and opening the door could cause it to spread. If you're unsure, touch the door with the back of your hand. If the door feels warm then don't open it.



04 Block all the gaps

If you're blocked in a room by the fire, close all the doors and use towels and sheets (wet if possible) to block any gaps (at the bottom of the door, for example). This will help to stop any smoke spreading into the room. If smoke does get in, keep as low to the floor as possible as smoke rises upwards.



05 Ring for the emergency services as soon as you can

If you're trapped, ring the fire brigade as soon as possible. Also open your windows and shout for help to attract the attention of any passersby or neighbours who may be able to help. This should obviously be the first thing you do if you don't have access to a phone.



06 Get to safety through the nearest windows

If you're trapped and in immediate danger then it's time to get out through the windows. If you don't have an escape ladder then drop as much bedding and cushions out of the window to soften the landing, then climb out and lower yourself down before dropping.

WORKSHOP

PROJECT

02

SHOOT YOUR OWN VR MOVIES

Because high-definition videos are so passé

This year the virtual will become reality. Google Cardboard is out now; the Oculus Rift headset is available to preorder; and the HTC Vive and Playstation VR aren't far behind. Soon you'll be able to immerse yourself in virtual reality in all sorts of ways. But, rather than passively viewing content, wouldn't it be great to shoot your own three-dimensional home movies?

One of the best-kept secrets in tech, there are actually several cameras out now

that shoot virtual reality video. High-end camera like the Nokia OZO and GoPro Odyssey produce the best results but have five-digit pricetags, making them a bit too expensive for most of us, but you can also shoot and share 360-degree photos and videos for just a few hundred pounds.

In this workshop, we will recommend the best VR cameras to buy and show you the steps needed to get your video created and online.

A CAMERA TO SUIT ANY SIZE OF WALLET

Nokia OZO

If you have money in your wallet to burn and want a completely professional VR camera then you might want to pick the OZO. As you'd expect, the quality is staggeringly good and you can attach it to a drone and monitor the image live via your computer or VR headset.

£40,000 | \$60,000 | ozo.nokia.com



360Fly

Like a three-dimensional GoPro, the Fly360 attaches to your helmet to shoot immersive, high def action footage. It's also water, dust and shock-resistant so you can use it almost any situation. It has an impressive 32GB storage.

£430 | \$400 | 360fly.com

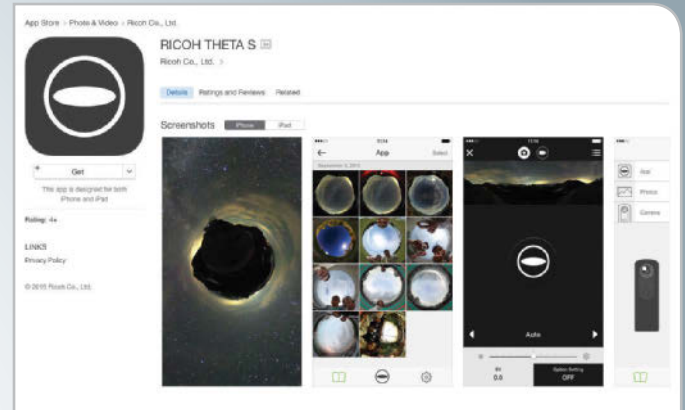
Ricoh Theta S

The Theta S is the cheapest VR video camera currently out there, but still offers 14MP high-resolution video. The 8GB internal storage sounds tiny, but actually works out as over an hour of video or 1,600 still images. For serious filmmakers, the Theta S also works with standard tripods.

£300 | \$350 | theta360.com



SHARE YOUR OWN VR VIDEOS

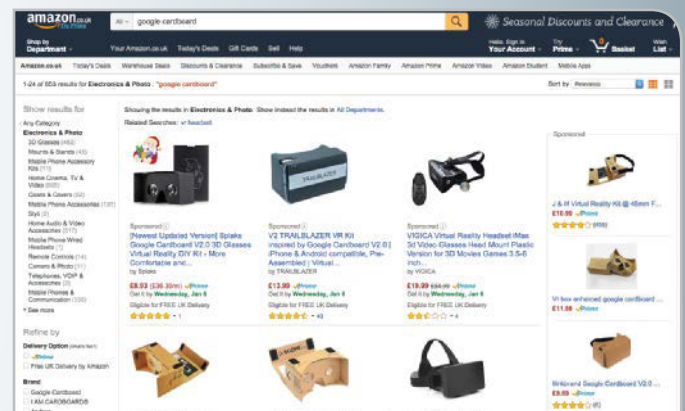
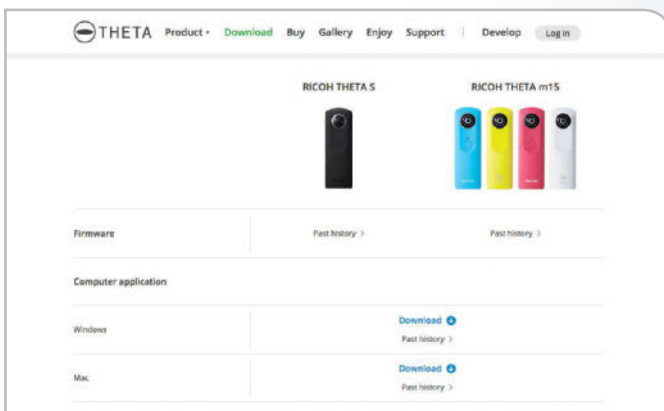


01 Time to hit the overdraft

Putting a VR video on the internet is simplicity itself, but the most painful part of the whole process is the money you'll have to shell out to buy your VR camera. They're still new, so prices are a little high (eventually we'll all have them on our phones), but you can pick up a decent one for around £300 (the Theta S).

02 Pick the perfect shot

Alongside your camera, you need to download a companion app for your phone to control it. When it comes to shooting, you either want to mount the camera or use an extra-long selfie stick – remember that it's completely 360 degrees, so if you're holding it in front of you then you will be in the way.



03 Get your video ready for YouTube

The videos (which, if you're using the Theta, can only be a maximum of three minutes long) are recorded in the MOV video format, so you'll need to convert them to MP4 to upload them to YouTube. There are plenty of video conversion programs out there, but handily, Ricoh does one for Mac or PC – which you can download from bit.ly/1Q4Lmmr.

04 Now share it on YouTube

Upload the video to your YouTube account and share it with the world. You can use the mouse to scroll around the video or, even better, play it on your phone through a VR headset. There are plenty on the market, but you can buy a cheap Google Cardboard one from just £3 – just make sure that you get one with a 45mm focal length as the quality will be better.

Allie Home

A slightly different take on the VR camera, the Allie Home offers 360-degree surveillance so burglars have nowhere to hide. Each camera has two fisheye lenses and even infrared night sensors. Working with your smartphone, you can also communicate using the cameras, which have built-in speakers and microphones. **£420 | \$600 | alliecam.com**

"Your holiday movies can come to life"



WORKSHOP

PROJECT
03

BABYPROOF YOUR HOUSE

Make life easier for you and baby with our indispensable guide

Having a baby can be one of the most rewarding and satisfying things you'll ever do, but what happens when you bring this bundle of cooing/crying loveliness back into the home? You may think that your house is a domain of peace and tranquillity, but believe us when we say that danger lurks around every (sharp) corner.

You have to think ahead and babyproof your house for every stage of their development. When they're newborn, it's fairly easy to keep your baby safe in the house, but as soon as they begin to crawl then every piece of furniture, cupboard door and piece of fabric becomes a potential hazard.

You could always hire the services of a professional baby proofer, such as Baby Safe Homes (babysafehomes.co.uk), but there are plenty of cheap solutions to make your house safe for a baby that you can easily do on your own.

£14 | \$20
deltababy.be

Delta Baby Floating Mattress

Keeping your baby still during their bath can be tricky, but this floating mattress makes it easier. The baby lies partly in the water, leaving your hands free.



£15 | \$23
clevamama.com

ClevaMama Transparent Oven Door Guard

This super-useful transparent cover enables you to still actually see into your toddler-height oven, but reduces the heat from the oven door by up to 50 per cent.

KITCHEN

1 Turn pan handles

When you're cooking, remember to keep the handles of the pans turned in away from the edge of the cooker to make sure young hands can't grab at them.

2 Use rear rings

To be extra safe, always use the rings at the back of the cooker if possible and never leave anything on the cooker unattended.

3 Lock up knives

Any sharp cooking utensils and knives should be kept in drawers (preferably ones fitted with safety catches). This includes cutlery too.

4 Childproof lids

Never put household chemicals into unmarked containers and make sure that any bottles containing chemicals (cleaning products, for example) are fitted with a childproof lid.

5 Set aside space

If your child loves exploring the kitchen then why not set aside at least one cabinet for them? Pick one away from the cooker and fill it with safe, kitchen-related objects for them to play with – such as wooden spoons or plastic containers.

BATHROOM

1 The elbow test

Always put in warm (not hot) water for their bath. The old fashioned elbow test is a good one or if you want to be technical about it, use a thermometer to make sure the water is between 35 and 37 degrees Celsius.

2 Don't slip!

It goes without saying, but you should definitely fit a non-slip mat in the bath as this will also come in handy for adults if you have a shower attached to the bath.

3 Shallow water

When bathing your little one, you should only put enough water in the bath to cover their legs, which should be between 5 and 7.5cm of water.

4 Run cold water first

Run cold water into the bath first and then add the hot water. This makes sure that the bathwater is never scalding. You could always consider fitting a thermostatic mixing valve to your taps too.

5 Supervised bathing

Another obvious one here, but never leave your baby in the bath unsupervised, however briefly. It's also a good idea to get yourself a good quality baby-bath seat too, but even with that you should never leave them in the bath on their own.



STAIRS

1 Get a stair gate

When your baby starts to crawl, it's time to fit the stair gates. You'll need one at the bottom of the staircase and another at the top, and make sure that the gates always stay shut.

2 Check bannisters

Check the width of the spacing between your bannisters. If it's potentially large enough for your baby to crawl through then we recommend investing in some safety netting.

3 Use the rail

Always concentrate when carrying your baby down the stairs. Keep one hand free at all times and use the hand rail for extra stability if you have one. If not, then get one fitted!

4 Keep stairs clear

Although it's easy to dump everything on them, it's a good idea to keep your stairs free of clutter. When your baby starts crawling it's easy for them to slip on an object left on the stairs.

5 Carpet your stairs

If you have a wooden staircase then think about investing in some carpet for it. Carpeted stairs are less slippery than wood and softer to land on if there are any accidents.



£47 | \$65

dreambaby.co.uk

Dreambaby Retractable Gate

A practical redesign of the stair safety gate, Dreambaby's gate retracts to the side when you don't need it and comes with a pair of brackets for easy redeployment.

LIVING ROOM

1 Get a fireguard

Open fireplaces are fabulous features, but they're possibly the most baby-unfriendly part of a house. Even when the fire isn't lit, make sure it's covered by a secure fixed fireguard at all times.

2 Cover radiators

Radiators can get very hot, so it's worth investing in wooden covers. Alternatively, you could always cover them with a small thin summer duvet when babies are around or just turn the temperature down to a consistent warm setting.

3 Fix furniture

Large items of furniture, like bookcases, should always be securely fixed to the wall or relocated to a child-free space just in case any toddlers try to climb on them when you're not looking. A lot of furniture now comes with its own fixings, but DIY stores will carry bracket sets if you need one.

4 Safety film

Internal glass should, ideally, be replaced. If you must have it, though, then we recommend attaching safety film to all of the panels, just to be on the safe side.

5 Cushion corners

Although they aren't very aesthetically pleasing, it's a good idea to fit corner protectors to the sharp corners of any low furniture. You can get packs of clear ones online that are both reasonably priced and fairly unnoticeable.

£5 | \$7

munchkin.com

Lindam Home Safety Kit

If you're child-proofing your house, this kit is great and has everything you need, from safety catches to door stoppers, corner cushions to socket covers.



WORKSHOP

PROJECT
04

FALL ASLEEP READING YOUR KINDLE IN BED

*Cut down on your
Kindle's blue light
emissions*

Where once people took an actual book to bed made out of something called paper (ask your parents), those with a desire for a spot of night-time reading are more likely to take their Amazon Kindle up with them nowadays. All well and good, but those of us that read our books on a standard tablet will have something called blue light emitting from our screens, which scientists now claim can have a detrimental effect on our sleeping patterns.

Thankfully though, help is at hand. While Android and iOS users have to download an app to overcome blue light emissions, Kindle Fire owners can simply update their OS to the latest version, which now includes a feature called Blue Shade. Blue Shade claims to have specialised filters that limit your exposure to blue light to make reading more comfortable on the eyes and, hopefully, give you a better night's sleep. Here's how it works...

"Limit your exposure to blue light to make reading more comfortable on the eyes"

INSTALL BLUE SHADE NIGHT READING MODE

01

Pick a Kindle

Make sure you have the right Kindle to be able to install and use the Blue Shade tint – it only works with the third-generation Kindle Fire HD, HD 10 or HD 8 tablets.

02

Time to update

That done, you can update the system software manually by connecting your Kindle to a computer and heading to the Kindle Software Updates page at amzn.to/1RLIo66.

03

Update over Wi-Fi

Or you can simply update over Wi-Fi. Make sure your Kindle has a decent charge (50 per cent or more) and then tap Quick Settings in the Status Bar and then Sync.

04

Find the bed

Now, with the software updated, pull down from the top of the Kindle and you will spot the new Blue Shade icon – it's the one shaped like a bed.

05

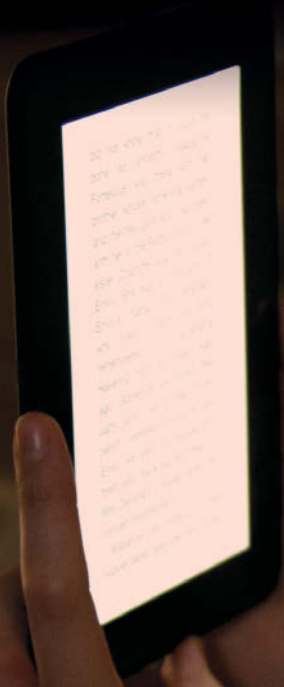
Soften the brightness

Tap on it and the brightness will immediately drop to 50 per cent. There's a further option for advanced settings, where you can tweak both the brightness and colour.

06

Fancy reading in moonlight?

The colour slider is particularly useful as it gives you a vast spectrum of options, depending on the darkness of your room – from Red Candlelight to Yellow Moonlight.



£130 | \$150
amazon.com

Fire HD 8

The Fire HD 8 brings you eight inches of high-definition content, and gives you impressive access to over 38 million books, films, TV shows, songs, Android apps and games.

SWEET KIT FOR SWEET DREAMS

£70 | \$100
misfit.com

Misfit Shine 2

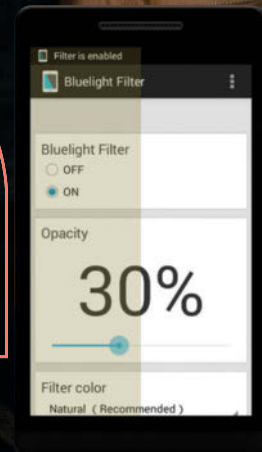
Alongside its many other features, the Shine 2 can also monitor your sleep patterns, producing a graph to show your light and deep sleeping periods during the course of the night.



Free
play.google.com

Bluelight Filter for Eye Care

This app for Android mimics the Kindle's Blue Shade tool by reducing the screen's blue light during night-time viewing, with five different filter colours available.



£40 | \$80
homedics.com

Deep Sleep White Noise Machine

Drift off with calming white noise. The Deep Sleep is the perfect way to relax, as it helps to block out outside noise for a much more peaceful sleep.



£180 | \$160
philips.co.uk

Philips Wake-up Light

The Wake-up Light increases its light setting over 30 minutes, starting with a soft morning red and finishing with a bright yellow light. This stimulates the body to wake up naturally.



£190 | \$300
withings.com

Withings Aura

Wake up in style with this state-of-the-art alarm clock that gradually increases its light and sound settings to smoothly wake you up in the morning.



WORKSHOP

PROJECT
05

FIX A PUNCTURED BIKE TYRE WITHOUT A REPAIR KIT

Feeling a little flat?

Cycling is most definitely on the rise – it's impossible to head out onto the roads on a warm day without spotting a train of Lycra-clad road racers. This is a good thing, but if you're one of those cyclists who's stuck in the middle of nowhere with a flat tyre then it's not quite so good.

We obviously recommend you take a puncture repair kit with you at all times, but there will always be times when you

have forgotten it or run out of patches, so if you're stuck with a puncture and no kit, what do you do? Thankfully, there are a few solutions out there that you can use to get you fixed up and back on the road. With the exception of the Patchnride though, these are temporary fixes, and although they should get you home in one piece, it's wise to take it steady until you can get your bike properly fixed.

"Stuck with a puncture and no kit, what do you do?"

METHOD

01

PLUG THE HOLE WITH LEAVES



01 Tyred out

Let's assume, for argument's sake, that you've headed out on your bike without a repair kit or a pump. Your tyre is flat and you're stuck in the middle of nowhere, so what do you do? Well, for starters, remove the wheel with the puncture and take off the tyre.



02 DIY, Bear Grylls-style

Collect lots of grass and leaves and pad out the tyre by filling it with the foliage – moulding them to the outer part of the tyre and working inward. You want to create a solid cushion so fill the tyre by compressing the filling and distributing it evenly around the tyre.

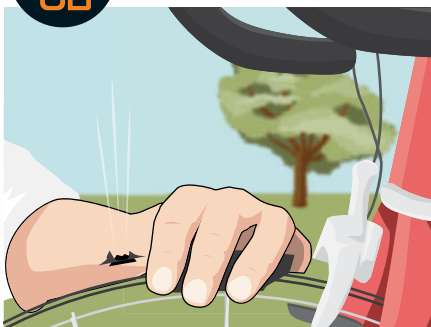


03 Safe and sound

Reattach the tyre to the wheel – taking care that the grass/leaf mixture doesn't fall out as you do – and then fit the wheel back onto your bike. It's not an elegant solution, but it will get you home alright. To be on the safe side though, take it steady and you should be fine.

METHOD 02

USE THE PATCHNRIDE



01 A patch made in heaven
A brand new device for the cycling market, the Patchnride claims to get you back on the saddle in less than 60 seconds after getting a puncture, so here's how it works. First locate the puncture on your wheel and then remove the cap from the Patchnride device.

02 Easy does it
Squeeze the sides of the tyre either side of the puncture and insert the pointed end of the Patchnride into the hole. Pull back the slider on the side of the Patchnride and then push it forward to insert the patch – this will attach itself to the puncture on the inner tube.

£34 | \$35
patchnride.com

Patchnride

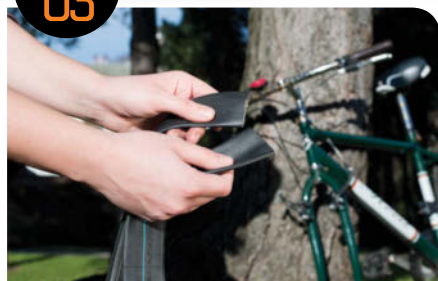
The puncture repair equivalent of keyhole surgery, this new gadget can repair a tyre without removing the wheel. Available to preorder now, the Patchnride will launch early this year.



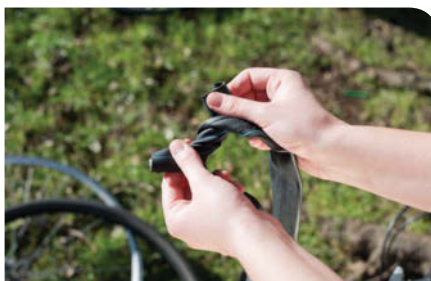
03 Where's the catch?
Now simply pump up your tyre and you're good to go. The Patchnride is designed to repair inner tube punctures of up to 3mm in size and claims to work with any tyre or inner tube. Too good to be true? Well, the technology is both sound and innovative and the only real downside we can see is that it might be a bit pricey to keep purchasing the repair patch pods.

METHOD 03

TIE A KNOT IN THE INNER TUBE



01 A wheely good idea
An alternative method to get you out of trouble, especially if there's no vegetation around, is even simpler. Again, remove the wheel from the bike and this time take out the inner tube. Locate the exact point of the puncture and cut the inner tube right through the middle of it.



02 A knotty problem
You now have to tie the two ends of the inner tube you have created together to form as tight a knot as possible. It's important here to keep as much slack in the tube as you possibly can, this is so you are able to get it back in the wheel – try to make sure you only use a minimum amount of the tube.



03 Practice makes perfect
Pump some air into the tube to check for leaks – you may need a few attempts at the knot to get it just right. When it's airtight, put the tube back into the wheel. Remember it will be hard as the tube is smaller and make sure you don't inflate the tube to its usual pressure, as this is just a makeshift mend to get you home.

114 | whatever happened to...

Lock and load

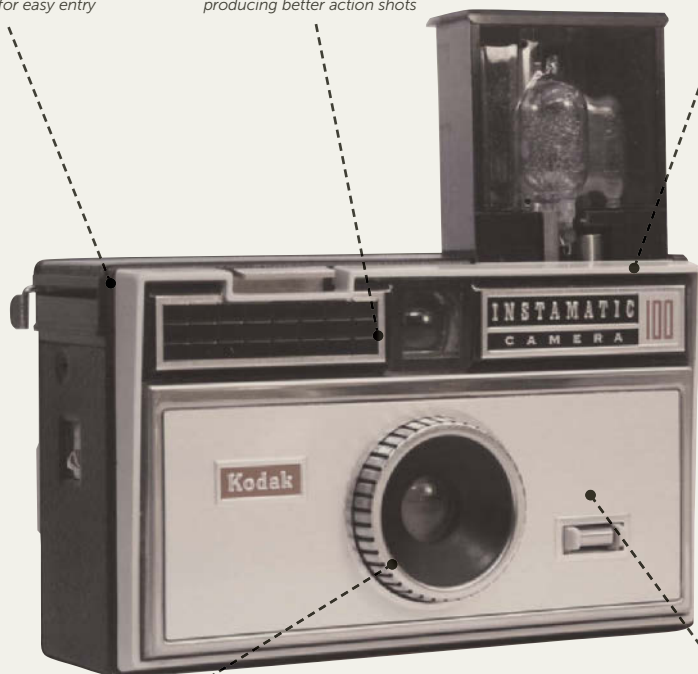
New film cartridges were placed into the back of the Instamatic camera, with a rear button being pressed to open up the back plate for easy entry

Shutter speeds

Normally the Instamatic's shutter speed was 1/90 per second. But when the flash holder was up, it upped to 1/45 per second, producing better action shots

Peanut bulb flashgun

While later Instamatic models had a rotating flashcube, the original Instamatic had a single AG-1 flashbulb. It would pop up with a press of the button on the front of the camera



No controls

Every early Instamatic camera came with both a fixed aperture and fixed flash modes, meaning you could only point, shoot and hope for the best

Battery power

Similar to the way disposable cameras work today, the original Instamatic cameras used three AAA batteries, which powered the flash

Whatever happened to...

Kodak Instamatic 100

The Instamatic ushered in a new era of affordable point-and-click cameras, selling 50 million between 1963 and 1970. While most people will reach for their phone rather than their camera to take a photo these days, the Instamatic's iconic style lives on through the square shape and filter effects of Instagram pictures.

They said...

"To load it is to love it."

Kodak advertising slogan

"The key to the 126 camera success beginning in the early 60s was easy-loading, drop-in film cartridges. The widespread advent of quick loading and autofocus 35mm cameras by the 1980s spelled the demise of 126 cameras."

Mr Martin's Web Site Camera Museum, mrmartinweb.com

Buy one today

Price: £13 | \$18

The Kodak Instamatic 100 is surprisingly affordable. A working model will cost around £13/\$18 from eBay or Etsy. Replacement flashbulbs are also quite easy to get, but the original 126 film cartridges are much harder to find, so retail for around £20/\$26. This can make snapping selfies an expensive habit, but with a simple modification to the camera, you can start using regular 35mm film that is much easier and cheaper to come by. For a guide to modding your Instamatic, visit bit.ly/1VdUe8D

How it worked

Instamatics were very simple cameras. They were the first to use Kodak's 126 format film cartridges, which had a backing plate and exposure counter built-in, so the camera didn't need one. With fixed shutter speeds, aperture and focus, it had no shooting settings beyond the flash. You could only point, shoot, and hope.

Gadget

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